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MALIGNANT DISEASE OF THE THROAT AND NOSE.

By the Same Author—

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MALIGNANT DISEASE

OF THE

THROAT AND NOSE.

BY

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PREFACE.

THIS volume presents a clinical and statistical study of Stricture of the Œsophagus, and of malignant diseases as they attack the larynx, nasal fossæ, and tonsils.

Care has been taken to prove almost all the points of importance in connection with the symptomatology, diagnosis, and treatment of these diseases, by the narration of illustrative cases observed in the Glasgow Royal Infirmary, and in private practice.

Those of Stricture of the Œsophagus are principally selected from patients who came under the Author's care during 1890-91, numbering in all sixteen.

The cases of Malignant Disease of the Larynx, eight in number, have been selected from a series of over fifty patients, and these are employed in the text to illustrate only special features in the disease.

Only three cases of Round-Celled Sarcomata, and two cases of Carcinomata of the Nasal Fossæ, have been treated by the Author, which shows the comparative rarity of these diseases; while, on the other hand, the relative frequency of Malignant Disease of the Tonsils is well illustrated by ten cases, described in the text. A list of all these cases, with epitomes, may be found at page 201.

It is needless to refer to the scope of this book further, as this information is given in the table of contents.

Before concluding this prefatory note, it is the pleasant duty of the Author to gratefully acknowledge his indebtedness to his friends Dr George S. Middleton and Dr Donald Macphail, for their valuable suggestions and careful revisal of the proof sheets while these pages were passing through the press; to his Assistant, Dr D. M'K. Dewar, for his preparation of the Index; and to the proprietors of "The Lancet" for the use of the woodcuts.

GLASGOW, *September* 1892.

ERNEST HART
BRITISH MEDICAL ASSOC

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MALIGNANT DISEASE OF THE THROAT AND NOSE.

MALIGNANT DISEASE OF THE THROAT AND NOSE.

CHAPTER I.

STRICTURE OF THE ŒSOPHAGUS.

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During the year 1891, an unusually large number of cases illustrative of the class of disease which will occupy our attention in this and the four succeeding chapters came under my observation. To these cases I shall specially refer, but at the same time I shall illustrate my remarks by occasional reference to cases seen before that time. Diseases of the œsophagus leading to more or less complete stricture are not as a rule met with in considerable numbers even in our large hospitals. Most of these cases were sent to me by their medical attendants, while others came to the out-door department of the Royal Infirmary, of their own accord, and simply complained of difficulty in swallowing, together with weakness, as a result of inability to take a proper amount of nourishment. In all the

cases, the most prominent symptom was difficulty or impossibility of swallowing food.

When we study the general symptomatology of diseases of the throat, we know that many conditions may manifest themselves by difficulty in, or even impossibility of, swallowing food. Hence various terms are employed to designate the character or degree of obstruction to the passage of food. When swallowing is painful, the patient is said to be suffering from *odynphagia*, as, for example, in inflammation of the œsophagus resulting from the action of corrosive agents. On the other hand, when the lesion is of a chronic character, such as cicatricial stricture or the pressure of tumours upon the gullet, the patient may suffer comparatively little pain, while the obstruction to swallowing is great. To this condition the term *dysphagia* is applied. Again, should the obstruction be complete, as in Cases 3, 4, and 8, the patient is said to be suffering from *aphagia*. Besides stricture of the gullet properly so called, the lesions which give rise to œsophageal dysphagia are numerous and varied; but as most of them will require to be referred to when we come to consider the question of diagnosis, I will simply enumerate them at present. Congenital malformations and the impaction of foreign bodies in the gullet very seldom give rise to much difficulty in diagnosis, but it is otherwise in those cases of aneurism of the aorta, mediastinal tumour, enlarged lymphatic glands, exostosis or curvature of the spine, which, by causing pressure upon, or distortion of, the œsophagus, may lead to serious difficulty in swallowing. The cases of aneurism of the transverse arch of the aorta causing pressure on the gullet at the level of the bifurcation of the trachea are perhaps the most important.

Using the term "stricture of the œsophagus" in its proper sense, it may be divided into four varieties, viz:—malignant stricture, obstruction by benign tumours, cicatricial stricture, and spasmodic stricture. We shall now consider these diseases in detail, and afterwards discuss the questions of prognosis and treatment.

Two forms of malignant disease attack the œsophagus—the carcinomata, which are very common and usually occur as primary lesions, and the sarcomata, which are rarely met with in the gullet unless as secondary to sarcomatous formations in other parts.

Carcinoma is by far the most important and also the most common new formation met with in the gullet; and it appears that any part of the tube may be attacked, although there are certain points which are more liable to the disease than others. Taking, for example, the seven cases of cancer of the œsophagus which have come under our notice during the winter of 1891, it was observed that in two the tumour occupied that portion of the œsophagus situated behind the larynx; in other two the stricture was found to be on a level with the bifurcation of the trachea, while in three the cancerous growth attacked the gullet at its lower extremity. There is considerable difference of opinion as to the most common situation of the primary disease. Some observers assert that the lower third is the most frequent seat,[1] while Mackenzie,[2] and others assign 44 per cent. of cases to the upper third, and say that only 22 per cent. occupy the lower third.

As far as my own experience goes, it appears that the most common spot to find the primary growth, at least as far as can be discovered during life, is immediately behind the cricoid cartilage, and that the next point most liable to attack is at the level of the bifurcation of the trachea. Statistics derived from the inspection of pathological reports do not afford very reliable data; because in such instances the disease is not observed at its onset, but after it has terminated the life of the individual and extended far beyond its primary focus. Even in cases examined during the early stage of the disease it is difficult to ascertain the precise limits of the lesion; all we can learn is the highest point of obstruction, unless in those rare cases in which

[1] Coats' Pathology, p. 713, 1889, and Petri, Berlin, 1868.

[2] Diseases of the Œsophagus, p. 88.

the œsophagoscope may be employed. From a clinical point of view, the most important fact is that carcinoma of the œsophagus is very frequently situated and may cause obstruction, at the level of the bifurcation of the trachea, namely, at a part where the gullet is likely to be pressed upon by a mediastinal tumour, or by aneurism of the arch of the aorta. As a matter of interest, I have contrasted a number of tables drawn up to prove the part most liable to attack; but the discrepancies amongst them are so remarkable that the value of individual tables is by no means high. In 510 which I have collected, in only 445 instances is the exact portion of the gullet primarily attacked stated, as shown in the following table:—

Upper Third,	. . .	227 = 51%
Lower „	. . .	120 = 27%
Middle „	. . .	98 = 22%
		445 = 100

For practical purposes we must, however, consider carcinomatous disease in reference to the situation of the tumour. When situated high up and of small size, the tumour possibly may be removed by œsophagectomy, or œsophagostomy may be performed, while if large in size the neoplasm may cause obstruction to respiration and demand tracheotomy. Again, when the tumour is situated at the bifurcation of the trachea, great care must be taken in the employment of bougies, on account of the danger of causing injury to the trachea or aorta, and at the same time, before adopting any line of treatment, the possibility of the obstruction being due to an aneurism must be eliminated.

Coming now to the consideration of the *etiology* of carcinoma of the gullet, we know just as much and as little regarding the causation of tumours in this situation as in other parts of the body. The two important predisposing causes are sex and age; we will leave out of account the question of heredity. Some

observers, however, attach considerable importance to heredity as a cause of malignant disease, but to my mind the influence of inheritance in the production of malignant disease has not been proved, as it has been, for example, in such diseases as hæmophilia, Daltonism, and diabetes insipidus.

Age is a most important factor. Of 510 recorded cases, the ages of which I have ascertained, 80 per cent. were between the ages of forty and seventy years, 12 per cent. were below forty, and 8 per cent. above seventy. Again, on examining more carefully into those between the ages of forty and seventy, nearly a half (or 40 per cent. of the 510 cases) were found to be between forty-five and fifty-five years of age. In considering the influence of age it must always be remembered that each decennial period does not contain the same number of individuals; so that, to be quite accurate in our calculation, it would be necessary to estimate the percentages with the fact in view that each decennium as it advances contains fewer individuals.

Another circumstance which must be observed is that out of the seven cases of cancer of the gullet, details of which are given in these pages, only one was a woman. One in seven is, however, a little below the general average. Of the 510 cases referred to already, 108 were women, and 402 were men, and of all the cases which have come under my own observation only 10 per cent. were women. For practical purposes it may be said that four-fifths of the cases of cancer of the œsophagus occur in males. In this particular, epithelioma of the œsophagus resembles the same disease as it attacks the lip, the tongue, the larynx, or the rectum. But while these parts are more liable to be attacked by malignant disease in men, disease of the sexual organs in women is disproportionately frequent. No reasonable explanation has yet been offered for this peculiarity, and it remains as one of the many facts in regard to the etiology of cancer of which we know little.

Regarding the exciting causes of cancer of the œsophagus, there is only one point worthy of attention—namely, that

protracted slight irritation is likely to determine the site of the primary growth. This point has been well illustrated by the cases in which the points of selection were (1) the upper part of the œsophagus, where the tube becomes suddenly narrowed behind the cricoid cartilage, and where, during deglutition, the bolus of food is moulded into form to pass down the gullet; (2) at the point where the œsophagus passes behind the bifurcation of the trachea; and (3) where it penetrates the diaphragm, in all of which situations there is more likely to be obstruction to the passage of large morsels of food. Again, it has been observed that epithelioma of the œsophagus may follow upon simple stenosis, or upon an old cicatrix, just as we may have malignant disease planted on an old syphilitic cicatrix on the tongue, or a burn of the skin.

In many of the cases which have come under my notice, the patients have told me that for a considerable time, sometimes for years, before they experienced any difficulty in swallowing, they were troubled with "indigestion and acidity," and had been falling off in general health. In instances where these symptoms existed for only weeks or months, the possibility is that the malignant disease was present from the onset, but when symptoms of gastric and œsophageal irritation have been present for years previous to any definite obstruction to swallowing, one cannot but seek an etiological relationship between the chronic inflammatory lesion and the carcinomatous growth. Is it likely that the tumour in these cases, as in the more acute cases, existed from the beginning of the illness?

Passing now to the consideration of the *pathology* of the carcinomata of the œsophagus, we have already seen that there are certain points of selection; but while this is so, any part of the tube may be attacked. When the disease is, as is usually the case, a squamous-celled epithelioma, the histological structure and mode of growth closely resemble cancer of the lip, or of the larynx. A small, raised, warty, or nodular tumour appears.

The proliferation of cells probably takes place, in the first instance, in the deeper layers of the mucous membrane, but very soon the basement membrane is perforated, and the actively increasing epithelial elements infiltrate the underlying connective tissue. The tumour may remain isolated, but as a rule it assumes an annular appearance, and soon forms a distinct obstruction to swallowing. The disease may further extend into the muscular coat, and afterwards into the adjacent parts. The central or more prominent parts of the growth may now ulcerate, and, as a consequence, at this stage the impediment to swallowing may be somewhat relieved. If death occurs at this period, a deep ulcerated ring will be seen to be overlapped by the elevated edges of the upper and lower portions of the tumour. In most instances the obstruction is not entirely due to the space occupied by the tumour proper, but is increased by inflammatory induration of the connective tissue. This inflammatory new-formation, together with the granulation tissue of the ulcer, contracts as the disease advances; so that while the epithelioma is being destroyed by a destructive process the calibre of the gullet is soon after reduced by the contraction of cicatricial tissue. It is therefore commonly observed that, during a certain period in the course of the disease, marked improvement may occur in swallowing (as in cases 4 and 8), while later on dysphagia becomes more marked than at any previous time.

When examined microscopically, the squamous-celled epithelioma is usually found to be of the infiltrating form. The epithelium is seen to infiltrate and destroy the sub-mucous connective tissue by sending long processes and laminated capsules into the underlying tissue. These capsules are very characteristic of this form of epithelioma. In the aggregated form the cells take, on section, the appearance of globes, but individually they are arranged in a concentric form, like the coats of an onion. The growth is usually softer, and the connective tissue more abundant, than is observed in epithelioma of the lip, or of the skin.

But while the squamous-celled carcinoma is the most common growth in the gullet, other varieties of cancer are met with.

Case I. (1)—For example, three years ago a patient who was under my care died from starvation, with the most marked and complete obstruction at the lower end of the œsophagus, and at the post-mortem examination a tumour was found occupying the three lowermost inches. The new growth uniformly infiltrated the œsophageal wall, and both its lower and upper extremities were abrupt, and the parts below the cardiac orifice were free from disease, while the mucous membrane of the gullet above the tumour was the seat of only slight inflammatory changes. There was no ulceration at any part. On transverse section the tumour was seen to occupy the whole thickness of the wall, and measured from the mucous surface to the outermost limit about half an inch. The lumen of the tube was so reduced that even after death it would only admit a No. 3 urethral bougie. On microscopical examination the tumour was proved to be a cylindrical-celled epithelioma, or adeno-carcinoma, similar to what is usually met with in the rectum. It presented a distinctly glandular appearance in some parts; while in others, as a consequence of active cell-multiplication, the adenoid structure was not strictly preserved, and the cylindrical form of the cells was lost, except, perhaps, in those forming the layer next the stroma. These aggregations of epithelial cells were of considerable size, and were separated from one another by a coarse alveolar stroma, partly composed of newly formed connective tissue, and partly of dissected involuntary muscular fibres. This growth closely resembled in its structure and history the destructive adenoma of the stomach, and of the large intestine. These neoplasms start in the mucosa, but soon invade the deeper layers, and are accompanied by an inflammatory connective-tissue proliferation, together with the development of a large number of neoplastic tubules. These first invade the submucosa, but very soon thereafter they extend, ultimately dissect their way between the muscular bundles, and may even reach to the

serous covering of the alimentary canal. In the case now under consideration, the patient was starved before the growth had time to extend into the neighbouring tissues, or give rise to metastasis.

Mr. H. T. Butlin,[1] in his admirable monograph on Sarcoma and Carcinoma, refers to three cases of hard cancer or scirrhus of the gullet. He says: "The hard cancers are said to have presented a well-marked alveolar structure, and in one of them the mucous glands were thought to be the point of departure of the disease. The duration of the third case is not known, for the patient was too weak to communicate the history of his illness during the two days he was an inmate of the hospital before his death; but the duration in each of the first two cases was much longer than in the most prolonged of the cases of epithelioma. Even at the end of two years the second case does not seem to have completed its course, for neither the glands nor any of the organs were the seat of secondary growths. And in the first case, although the disease was believed, on what appeared to be sufficient grounds, to have existed for upwards of three years, only a few small nodules were found in the lungs and one small tumour in the liver, while the condition of the glands is not recorded." Three years ago I saw the last of a case very similar to the one just quoted.

Case II. (2)—This patient, a man aged fifty-nine, consulted me for the first time on Nov. 1st 1886—that is to say, about two years previous to his death, and nearly three years after the onset of the first symptoms of stricture. In other words, without the aid of an operation, the patient lived for five years with a scirrhous cancer of the œsophagus. The first symptom was difficulty in swallowing, which was observed by the patient in January 1884. At first the dysphagia was so slight and transitory that he thought little of it, and he did not consult a medical man till November of the same year. At that time a No. 11 bougie could be passed, after which the patient experienced

[1] pp. 178 and 187.

some relief, and he did not complain of pain, nor at any time was blood observed in the vomited matter, or in the expectoration. He could swallow fluids and semi-fluid food with ease, but frequently he had difficulty in taking such articles of diet as bread, potatoes, and meat. In the interval between November 1884 and January 1886, so far as I could learn, the symptoms, although varying in degree slightly from time to time, remained practically the same at the latter as at the former date. Indeed he felt, himself, during the early months of 1886, that he was swallowing more easily; at the same time his strength and weight improved, and a No. 15 bougie could be passed with ease. This favourable condition continued till July, when gradually but steadily the stricture became more severe, and when, in November 1886, he consulted me, I could with difficulty pass a No. 7 bougie, and the patient was considerably emaciated. The following table of weights in pounds is very interesting, and can be relied upon:—

	1883.	1884.	1885.	1886.	1887.	1888.
January ...	—	151	144	141	132	118
March ...	—	153	142	145	134	112
May ...	156	150	142	145	127	101
July ...	—	145	140	137	128	—
September	158	143	142	136	125	—
November	—	143	140	132	121	—

Taking the years from May 1883, it will be seen that during the first he lost only 6 lb., the second 8 lb., the third gained 3 lb., the fourth lost 18 lb., and in the fifth year 26 lb.; in all the loss was 55 lb. This slow development of the stricture and very gradual loss in weight is in marked contrast to what is seen in other forms of cancer; and even although the case extended over such a long period, the patient did not die from starvation, but in consequence of secondary formations in the lung. The tumour occupied the lower fourth of the œsophagus, was almost as hard as cartilage, and both in the bronchial glands and in the liver

small hard secondary formations were discovered. The nodules at the root of the lung had caused constriction of the bronchi, and very extensive and marked passive pulmonary hyperæmia. I have under observation at present a man (Case 6) whom I believe to be suffering from the disease under consideration (see also Case 3).

Soft cancer or acute carcinoma is said to be very rarely seen in any part of the œsophagus, so that the following cases are of special interest. Only one case of acute carcinoma has come under my own notice. But to show that acute carcinoma is met with in the gullet, I may refer to a case published in the *Glasgow Medical Journal*[1] by Dr John Fox. I will not occupy space by referring to the clinical history of the case, but the following is the account of the post-mortem inspection. On examination after death there was found in the middle of the œsophagus a pretty firm mass, about an inch and a half long, and almost completely closing up the passage. The œsophagus, at the part occupied by the tumour, was firmly connected with the structures at the arch of the aorta, but no ulceration of these parts had occurred. The glands at the cardiac end of the lesser curvature of the stomach were enlarged and indurated. The stomach and other organs seemed free of disease. Microscopic examination of the tumour in this case was made by Dr. Joseph Coats, and he writes "that the structure of the tumour presents the characters of medullary cancer, and not of the epithelial form, which is more usual in the œsophagus. The glands from the neighbourhood of the stomach also present similar microscopic characters." Dr. Joseph Coats informs me that in the Western Infirmary museum he has three specimens of acute carcinoma of the œsophagus, and the patient H. C—— (Case 10), to whom I shall refer hereafter, is also suffering from this disease.

Colloid cancer may attack the œsophagus, but as a rule degenerative changes are seldom observed in malignant growths in this situation. Death of the patient from starvation usually

[1] Vol. iv. New Series, p. 402.

occurs so early after the onset of the disease that little time is permitted for such retrograde metamorphosis to take place. Dr Bristowe,[1] however, reports one case in which the characteristic appearance of colloid cancer was shown in an instance in which the tumour invaded the lower part of the gullet and the cardiac end of the stomach, as well as formed secondary formations in the lungs and lymphatic glands. The report of the Morbid Growths Committee shows that the tumour presented the "ordinary features of colloid disease, and under the microscope the characteristic alveolar structure was observed."

[1] Trans. Path. Soc. Lond., vol. xix.

CHAPTER II.

STRICTURE OF THE ŒSOPHAGUS—*Continued.*

Carcinoma—General question of Diagnosis, with special reference to the situation of the Tumour as determining the symptoms and mode of death; also, difficulty in Diagnosis between Stricture and Pressure of Aneurism on Gullet, with illustrative cases.

In considering the *diagnosis* of carcinomatous disease of the gullet, three points require to be considered together. (1) Is there a carcinoma in the gullet? (2) What is its situation? (3) What is its nature? These questions cannot well be discussed separately, for not only do the symptoms depend upon the precise nature of the tumour, but perhaps even more upon its situation. In respect to situation I will therefore divide the cases into three classes:—(1) those in which the tumour occupied the upper part of the œsophagus; (2) cases where the growth developed at the bifurcation of the trachea; and (3) those instances in which the neoplasm was situated at the lower end of the gullet. Each of these classes may show a different history, and may present special points for consideration.

Case III. (3)—*Epithelioma (?) of œsophagus at the level of the lower edge of cricoid cartilage; history of steadily increasing dysphagia during two months, terminating in complete obstruction.*[1]

[1] In this case gastrostomy was performed on November 6th 1890, and the patient lived for exactly one year thereafter. At the post-mortem examination a scirrhous cancer was found at the level of the lower edge of the cricoid cartilage; no secondary formations; old tuberculosis and gangrene of lung.

—W. F——, aged fifty, a labourer, was admitted into the Glasgow Royal Infirmary, on November 3rd 1890, complaining of complete inability to swallow any food. The only substance which he could take by the mouth was a very small quantity of brandy and water. He stated that two months previous to admission he experienced a feeling of tightness in the throat on swallowing dry and solid food. This tightness he referred to the region of the larynx, and stated that it had remained always present, although it varied a little in degree from time to time. This constriction, however, increased, so that three weeks ago he was only able to take soft or fluid food. He did not complain of pain. There was no history of syphilis or of injury to the gullet, nor had the patient noticed at any time blood in his sputum. On passing a No. 13 bougie a distinct obstruction was found eight inches and a half from the teeth, and this stricture was so complete that no instrument could be passed through it. On palpating the neck a hard swelling, two inches in length from above downwards, was observed, situated behind the cricoid cartilage and the trachea, but there was no enlargement of lymphatic glands or obstruction to respiration. Physical examination of the chest revealed nothing abnormal.

Case IV. (4)—*Epithelioma of the œsophagus behind the cricoid cartilage; rapid development of dysphagia and dyspnœa, requiring gastrostomy and tracheotomy: good result.*—Mrs C——, aged forty-three, was admitted into the Infirmary, on December 23rd 1890, complaining of an obstruction to swallowing, and slight pain in the throat, which sometimes extended to the ears. On inquiring into the history of the case it appears that she has always enjoyed good health, with the exception of trivial ailments, until the beginning of November, when she complained of pain and dryness at the back of her throat. On examination her medical attendant discovered the pharynx to be deeply congested, and a small ulcer was seen a little to the left of the middle line. Under treatment the condition of the throat

improved, the ulcer healed up, and she felt much easier. A few days after this recovery she again consulted her doctor on account of difficulty in swallowing. He passed a probang into the œsophagus, and "felt an obstruction on withdrawing it," and he noticed that the bougie was stained with blood. Slight hæmorrhage continued for some hours. Her attendant, Dr Drysdale, suspected malignant disease; but, owing to the sudden onset of the symptoms, and the almost complete absence of pain, he felt reluctant in expressing an opinion regarding the nature of the disease, and advised the patient to consult me. When I saw her for the first time on December 11th 1890, she was weak, anæmic, and much emaciated, and stated that for the last three weeks she had been unable to take any solid food, but was still able to take fluid and semi-fluid diet with ease. She told me that since the middle of November the symptoms had steadily become worse, and that during the last six weeks she had lost considerably in weight, and, although she could not give me exact figures, she believed that she had lost about 28lbs. On examination, I discovered a hard, firm swelling immediately behind the cricoid cartilage, and extending from the level of the vocal cords downwards for a distance of about an inch and a half. It was found impossible even to pass a small-sized bougie, but on examination with the laryngoscope no encroachment on the lumen of the air passage was observed, either by pressure from behind or by invasion of the wall of the larynx. The voice was perfect, and the movements of the cords complete. On palpation externally, not only was the tumour described above apparent, but there were also several small firm swellings, the largest of which was about the size of an almond, and was situated to the right of the thyroid cartilage, where it was firmly adherent and embedded in the surrounding structures. Considering all the circumstances of the case, I advised the patient to come to Glasgow, and have treatment in the Royal Infirmary, where I successfully performed gastros-

tomy on January 29th.[1] When dismissed, although the lumen of the larynx was encroached upon, there was still sufficient air space to allow of the patient breathing freely. The right vocal cord was fixed in the position of complete adduction; voice good.

In those two cases the stricture was situated high up, and in both, the onset of the symptoms and the development of the dysphagia were extremely rapid, so rapid, indeed, in the second case, as to raise a doubt whether the disease was malignant or inflammatory in its nature. This sudden difficulty in swallowing is probably the result of two circumstances. First, the disease involves the narrowest and least distensible part of the œsophagus; and, second, the action of the muscles of deglutition is directly interfered with by the tumour, consequently the food does not pass far enough into the gullet to allow the action of its circular fibres to come into play, hence the greater tendency of food to regurgitate into the mouth or larynx when the tumour is situated high up. In these cases there is still another danger, namely, obstruction to the entrance of air, either by pressure of the growth, leading to diminution in the lumen of the air passages by interfering with the circulation and producing œdema, or by the invasion of the larynx by the new formation.

In Case 4, tracheotomy required to be performed on March 28th, that is to say, eight weeks after the gastrostomy, on account of sudden œdema of the larynx.

In the second class of cases, viz., those where the growth has developed at the level of the bifurcation of the trachea, the supervention of dysphagia is generally, other conditions being equal, more gradual, but the special points in diagnosis are more difficult and various.

[1] Patient was dismissed on March 21st, but on account of sudden onset of œdematous laryngitis she was readmitted on the 28th, when tracheotomy was performed, and she returned home much improved on April 25th, and is reported to have improved during the spring and summer months, but when seen in October 1891, the glands were involved, and the larynx obstructed.

We have two cases of cancer at the level of the bifurcation of the trachea, and, in both, the development of difficulty in swallowing has been very gradual.

CASE V. (5)—*Epithelioma of the œsophagus at the level of the bifurcation of the trachea; ulceration and rupture into the aorta; early symptoms, dysphagia, afterwards improving, dyspnœa, unequal inspiration in lungs; dull area posteriorly; death from hæmorrhage.*—G. A——, aged fifty-seven, was admitted into the Glasgow Royal Infirmary on March 25th 1890, complaining of difficulty in swallowing, which, he said, commenced at the beginning of December 1889. The first difficulty he experienced was in swallowing solid food, and this gradually increased until the middle of February in the year 1890, when he had to give up taking solids, and since that time his diet has been composed entirely of liquid food. During the act of swallowing he feels as if the difficulty in deglutition was caused by constriction at the level of the cricoid cartilage, but once the bolus has passed that point it occasions him no trouble, nor has he ever suffered from vomiting, cough, alteration in the voice, or pain. The pupils are equal, and the radial pulses are synchronous and equal in force, although somewhat weaker than normal. On passing a bougie (No. 16) an obstruction is met with, thirteen inches from the teeth, so that the stricture of the œsophagus may be said to be situated between the level of the supra-sternal notch and that of the bifurcation of the trachea. The largest size of bougie which passed through the stricture was a No. 6. On inquiring into the history of the case, no evidence could be found to show that the patient at any time suffered from syphilis, or sustained any traumatic injury to the œsophagus. On palpating the neck, nothing abnormal could be discovered in the line of the gullet or in the lymphatic glands. The larynx and trachea, as far as could be seen, were quite healthy, but on the least exertion the patient suffered from well-marked dyspnœa.

Physical examination of the chest showed the cardiac sounds

to be pure, but feeble, and very irregular in rhythm; but there was no evidence of valvular disease. I did not examine the condition of the lungs critically, but posteriorly, in the interscapular space and to the left side of the spine, on a level with the fourth dorsal vertebra, and extending upwards and downwards from that point, there could be detected a distinct localised dulness occupying an area of about three or four square inches. Associated with this dulness on the left side, and at about the same level as the obstruction in the œsophagus, there was evidence that air was not entering the left lung as freely as the right.

The patient was sent to Dr James Wallace Anderson, who kindly furnished me with the following report:—"The upper left front of the thorax is slightly retracted, and there is a corresponding diminution of expansion, there also being a rather increased resonance on percussion over the same area. The respiratory murmur over this area is less full and free than on the right side, at some points being hardly audible, at others of a whiffing, wavy character, but always faint. Posteriorly there is a mere suspicion of dulness in the upper left interscapular region. The respiratory murmur is distinctly fainter on the left side at the level of the third, fourth, and fifth dorsal vertebræ, and this diminution is continued one or two vertebræ lower on that side. The respiratory murmur over the left lung generally, though quite audible, is fainter than on the right side. There is no alteration in the vocal resonance, and no râles are heard anywhere. Cardiac phenomena and circulation generally are all perfectly natural."

At this time (April 1st) I was quite satisfied that the case was one of cancer of the œsophagus, but as there was no demand for surgical interference I transferred the patient to Dr Wallace Anderson's care. During his residence in Dr Anderson's ward he was kept at rest in bed, and as a result of treatment the symptoms became less pronounced, and the patient desired to be dismissed, and to return to his ordinary employment. Between

April 1st and May 24th great improvement took place in his power of swallowing, and he gained in weight; so that when he was dismissed he was able to swallow not only fluids with freedom, but with a little care solid food as well. This improvement, with freedom from pain in swallowing, and the absence of vomiting, emaciation, or anæmia, led me to doubt the accuracy of my first diagnosis, and consider whether or not the dysphagia and impaired respiration on the left side might not be due to the presence of an aneurism or solid tumour at the bifurcation of the trachea. A large-sized bougie now passed with ease. During the summer months the patient enjoyed moderately good health, and was able to swallow well both fluid and semi-fluid food; but in the autumn he again began to suffer from dysphagia, and he stated that since he was dismissed from the infirmary he suffered greatly from breathlessness. Patient was readmitted into my ward on October 7th. On passing a bougie (No. 12) it was found to be impossible to get it past thirteen inches from the teeth. At this time I went over the case very carefully again, and found the patient to be very much in the same condition as in April, except that, perhaps, he suffered more from dyspnœa, and I made a note in the journal to the effect that "although there are no positive signs of aneurism, the situation of the obstruction, the dyspnœa, the impaired respiration on the left side, the area of dulness posteriorly, and the history of the case, raise the gravest suspicion of an aneurism at the bifurcation of the trachea." On October 18th, the patient spat up a small quantity of dark blood, and for the first time complained of pain in the chest. On the 28th he again suffered from a deep-seated gnawing pain in the præcordial region, and when I saw him in the morning he was looking very ill. At one o'clock on the following morning, the patient raised himself in bed suddenly, because of some distress referred to the chest. Immediately he sank back on the pillow and became blanched, his pulse at that time being small and thready, and a few minutes afterwards almost imperceptible, while he continued to

breathe after the pulse had ceased.[1] The breathing was of a sighing nature. Between each respiration an interval of about half a minute occurred, which gradually increased until the breathing ceased altogether. This form of respiration lasted for about eight minutes.

Post-mortem examination revealed a perforating malignant ulcer of the œsophagus opening into the thoracic aorta, causing fatal hæmorrhage into the stomach and intestine. Dr Lindsay Steven's report was as follows—

"The pericardium contains about three ounces of slightly blood-stained serum. The heart is very soft and flabby, and its external fat is much increased on the surface of the right ventricle. The aortic and pulmonary curtains are competent. There is slight atheroma a little above the free margins of the semilunar curtains, but the orifices of the coronary arteries are patent. The muscular tissue is very soft, but on the whole normal looking. On cutting into the septum, slight yellowishness of the fibres is observed. The lungs, trachea, and gullet are removed together. The left lung is pretty generally and moderately firmly adherent, the pleura in this situation being of cartilaginous hardness, and perhaps even slightly calcareous in parts. This very firm adhesion on the left side extends upwards as far as the fifth or sixth dorsal vertebra, but does not extend round towards the front. After the thoracic viscera have been removed, a probe is passed into the gullet from above, and its further progress downwards is completely arrested at the level of the bifurcation of the trachea. On passing the probe from the gastric end of the gullet, it passes through the entire length of the tube without any difficulty. The trachea is then opened along its posterior wall, almost to the bifurcation, but nothing abnormal is seen in it. The thoracic aorta is then laid open by cutting with the scissors from below upwards. Its internal coat presents tolerably healthy characters, but about an

[1] The mode of death was observed and described by Dr J. G. Gray, the resident assistant, who kept careful notes of the case.

inch below the arch, and towards its posterior border, a circular opening with thin and somewhat ragged edges is found; this opening leads into a ragged cavity. The gullet is next laid open, and at the level of the obstruction just mentioned a large ragged ulcerated cavity containing debris of blood-clot and broken down tissue is found in its wall. The upper margin of this excavation is raised and rather sharp, and presents the typical characters of the margin of a malignant ulcer. The cavity had evidently eaten its way into the aorta, and produced the aperture in that vessel described above. It should also be noted that the wall of the aorta, in the neighbourhood of the aperture, which is about the size of a threepenny-piece, is somewhat thinned."

CASE VI. (6)—*Scirrhus of the œsophagus at the level of the bifurcation of the trachea; very slow development of symptoms; gastrostomy successful.*—J. P——, aged fifty six, admitted into the infirmary on January 26th 1891. On inquiring into the history of the case, it appears that about six months ago he experienced slight difficulty in swallowing such articles of diet as butcher's meat, potatoes, and fish, but after a few attempts he was able to take a satisfactory meal. From being slight the dysphagia steadily became more marked, so that within two months of the onset of the symptoms he found that after taking a few mouthfuls of food just mentioned his gullet got filled up, and he felt a choking sensation in his throat. Sometimes after repeated attempts at swallowing such food was ejected, but he found little difficulty in swallowing oatmeal cake, porridge, or snow-cake. Soft bread was swallowed with greater difficulty. Fluid food has always been swallowed with ease. Between June and December 1890, the patient's weight was reduced 28 lb. When admitted into the hospital he was unable to swallow solid food, and had not eaten butcher's meat for some weeks. He was able, however, to take porridge, very finely minced meat, and bread when partaken of along with a good quantity of fluid. On passing an œsophageal bougie a firm stricture is discovered thirteen inches and a half from the teeth. From the situation of the stricture, the question was at

once raised whether the obstruction to swallowing was due to pressure from without, or to the presenee of a growth within the gullet. Careful physieal examination of the chest made by Dr Wallace Anderson and myself showed the thoracic organs to be quite normal. By auseultation of the œsophagus the aet of deglutition was shown to be delayed and prolonged below the level of the third dorsal vertebra. There was no evidenee of pouehing of the œsophagus above the seat of obstruetion, and on all occasions the quantity of food which regurgitated was never greater than what was last swallowed. At no time has the patient suffered pain, nor has blood been observed in the vomited matter. No history of injury or of syphilitic disease. During the time the patient was in the ward his general condition improved, and his weight was maintained at from 138 lb. to 139 lb. After being in the ward for two months he was dismissed, and requested to report himself once a fortnight. The patient returned to the Royal Infirmary, and gastrostomy was successfully performed in Deeember 1891. The patient was still able to swallow some food by the mouth.

When an obstruction to swallowing is detected at the level of the bifureation of the traehea, great care must be taken in the passage of bougies. While I was pathologist to the Royal Infirmary, a case came under my observation where a very complete obstruction to swallowing was caused by an aneurism of the aorta. In this case a physieian, supposing the obstruetion to be due to a tumour in the gullet, passed a bougie, and perforated, not only the œsophagus, but the wall of the aorta. The hæmorrhage which resulted eaused the patient to be sent to the Royal Infirmary, and she died shortly after admission. This ease made a very strong impression upon my mind, and, as a eonsequence, I have been most eareful, when I have discovered an obstruction in the situation indieated, to avoid the passage of bougies unless it is very evident that there is no aneurism or uleeration of the œsophagus. The following case illustrates some of the difficulties in forming an exact diagnosis, and may be

contrasted with case 5. In both cases there was a difficulty during the early stages of the disease in making a diagnosis.

CASE VII. (7)—*Aneurism of the transverse and descending portion of the arch of the aorta; dysphagia, dyspnœa, and paralysis of left vocal cord as early symptoms; physical signs equivocal; later symptoms more characteristic of aneurism.*—The patient, J. I——, a labourer, was admitted into the Glasgow Royal Infirmary, on the 5th September 1891, complaining of dyspnœa, dysphagia, and hoarseness. The first symptom complained of was difficulty in phonation, which commenced seven months ago. Shortly after this time the patient suffered from breathlessness, which varied much from time to time, but was always brought on by physical exertion; and the patient states that although the difficulty in breathing was not always the same, there was nothing corresponding to paroxysmal dyspnœa. Comparing one week with another, it may be asserted that the dyspnœa has been steadily increasing from the time of its first onset until the present. So much so, that, for some days previous to admission, he could not remain in the recumbent posture. In respect to difficulty in swallowing, it may be said that the patient never was prevented from swallowing fluid or semi-fluid food, but on many occasions he was quite unable to swallow such articles as bread, meat, and potatoes. On admission to the ward the patient, who is a stout, florid man, appeared to suffer considerably from breathlessness after ascending the stairs, but when rested for a short time he permitted a short examination to be made.

Laryngoscopic Appearances.—With the exception of slight hyperæmia of the mucous membrane, the colour of the larynx is normal. Both vocal cords are normal in appearance, but their movements are restricted, especially that of the left cord. It remains a little to the left of the middle line, both during inspiration and attempted phonation and has the bow-shaped appearance of paralysis of the tensors. During forced inspiration the chink of the glottis is only about half of its usual dimensions.

Examination of the œsophagus with a full-sized bougie revealed the presence of an obstruction at the level of the bifurcation of the trachea; but, on account of the equivocal symptoms and physical signs, it was thought inadvisable to use any force or even to repeat an œsophageal examination.

Physical examination of the chest reveals the presence of an area of dulness in the middle line in front, the centre of which is on a level with the second left costal cartilage, and the area may be said to occupy in all about three square inches. There is no pulsation over this area, nor can a murmur be heard. Posteriorly, at the level of the bifurcation of the trachea, the sounds produced by deglutition are prolonged, and there is a distinct delay in the passage both of fluid and semi-fluid food at the point indicated. The respiratory sounds are equally well heard in both lungs.

After carefully considering the symptoms and physical signs, it was clear that the diagnosis lay between an aneurism of the transverse or descending portion of the arch of the aorta, a mediastinal tumour, and a tumour of the œsophagus. The patient was sent to Dr Alexander Robertson for an expression of his opinion, when he favoured me with the following report:—

"There is probably a tumour in the anterior mediastinum pressing on the trachea immediately above the bifurcation. The points in favour of a tumour, as opposed to an aneurism, are negative and positive:—The negative are that an aneurism in this situation would probably have induced pulsation in the episternal notch, and, with the prominent symptoms presently connected with his breathing, there would probably have been a wider area of dulness than there is. There would probably also have been interference with the circulation in the arm or arms, or in one or other side of the neck. There is no expansile sensation nor sensation of pulsation on compressing over the chest wall. There is no bruit, although, of course, this is an uncertain indication."

"The positive indications are:—The presence of an area of dulness in the sternal region corresponding with the insertion of the second ribs, and of about half an inch above, and half an inch below this point. To the right side of the chest the heart sounds are unusually well conducted. The veins of the chest and abdomen, and even the back of the chest, are more prominent than usual, especially when patient coughs. When patient bends his head backwards the oppression of breathing is markedly increased. There does not appear to be any difference in the breathing in the two lungs. The character of the breathing seems more indicative of obstruction to the respiration in the trachea or bronchi than at the vocal cords."

During the first fortnight of the patient's residence in the ward considerable improvement occurred, both in the respiration and in deglutition. But towards the beginning of October the dyspnœa became so marked that the patient was unable to maintain the recumbent posture during sleep, and even when kept in the semi-erect position he had difficulty in procuring a good night's rest. During this time the sputum had been increasing in amount, and was more viscid and difficult of expectoration than formerly.

On the 10th of October the following note was made:—"Since admission, with the exception of the first fortnight, the condition of the patient has not improved, and he now complains of great difficulty in breathing, especially during the night; so much so, indeed, that it has been found necessary for the last fortnight to keep him in the erect posture while asleep. Since the beginning of October the sputum has been more or less stained with blood.

"Physical examination of the chest shows the dulness noticed on admission, and referred to in Dr Robertson's report, to be unaltered, and there is still no pulsation at any part, and the pulses remain equal. The presence of blood in the sputum, however, strengthens the supposition that there is an aneurism at the transverse portion of the arch of the aorta."

On the 18th of October, and during the two preceding days, the patient had considerable difficulty of expectoration, while the difficulty in breathing was greater than before, so that the patient got almost no sleep at night.

On the morning of the 19th inst., patient died suddenly. While he was in the act of coughing he vomited a large quantity of blood, and expired within a few minutes. There was marked pallor of the skin and mucous membrane at death.

Post-mortem examination revealed multiple aneurisms of the thoracic aorta with rupture into the trachea and erosion of the vertebræ.

The following note was made by Dr Steven in the *post-mortem* journal:—"The left recurrent laryngeal nerve cannot be traced behind the aneurismal tumour, in whose wall it has become incorporated. It is easily found, however, below the tumour and above, and is seen in the preparation. The right recurrent laryngeal nerve is also dissected, and found to be normal. The anterior wall of the transverse aorta is removed, when it is seen that there is a large sacculated aneurism filled with blood clot. It communicates with the interior of the vessel by a large opening with rounded margins. The aneurism springs from the posterior aspect of the aorta, and has become firmly incorporated with the anterior surface of the trachea, immediately above the level of the bifurcation. A black probe has been passed from the interior of the aneurism through the small opening into the trachea. The left ventricle is somewhat hypertrophied, but all the valvular structures are apparently normal. The lungs are voluminous and, indeed, over-distended, the margins being rounded and emphysematous-looking. The pleural surface of the lung shows numerous areas of a bright red colour, due to blood shining through it, and it is perfectly evident, from the appearance of the pleura, that the pulmonary tissue has been extensively insufflated with blood. No tumour can be seen or felt in the anterior mediastinum, and it is therefore resolved to remove the contents of the mouth,

neck, and thorax, *en masse*. In doing this, a small aneurism, at the junction of the transverse and the ascending portions, is opened into, at the level of the fourth and fifth dorsal vertebræ, which, on their left side, have been eroded by the tumour—the intervertebral cartilages escaping. This aneurism is oval in shape, and an inch and a half or two inches in length, the long diameter being in the long axis of the vessel. After removal the œsophagus is opened, and, beyond containing a little blood, presents no abnormal appearance. On opening the trachea along its posterior surface, a minute aperture, with opaque, brown, sloughy edges, and only admitting the point of a surgeon's probe, is discovered in the trachea immediately above the level of the bifurcation, and situated on its left side. The tracheal mucous membrane, for some distance around the aperture, has a dark red colour. This aperture communicates with the interior of an aneurismal tumour springing from the posterior wall of the transverse arch."

I have narrated this case in detail, in order that some of the difficulties in forming a diagnosis may be appreciated, when the obstruction to swallowing is situated at the bifurcation of the trachea.

In other cases, difficulty in diagnosis is only experienced during the early stage of the case, when, with evidence of well-marked obstruction in the œsophagus, there are no physical signs directly pointing to aneurism, and the only symptom which leads one to suspect serious disease of the aorta is paralysis of the left vocal cord. The value of this symptom in distinguishing between aneurism and other causes of œsophageal obstruction is considerable, and in one of the cases seen in 1890, it, to a great extent, prejudiced my mind in favour of aortic aneurism as the cause of the dysphagia, even although no other symptoms pointed in the same way. While it was quite true that, in a few exceptional cases, unilateral paralysis of the muscles supplied by the inferior laryngeal nerve may be caused by other condi-

tions, I think it is of the utmost importance to bear in mind the undoubted fact that aneurism of the transverse arch causes paralysis in the large majority of cases. Indeed, for practical purposes, it may be looked upon as the cause of paralysis in nineteen out of twenty cases. Undoubtedly, cases have been recorded in which paralysis of the left recurrent laryngeal nerve has been the result of pressure by tumours in the œsophagus,[1] by enlarged bronchial glands, by pleuritic adhesions or fibroid induration of the apex of the left lung, by enlargement of the thyroid body, by great pericardial exudation, or by hypertrophy of the heart, leading by pressure or displacement to interference with the function of the nerve. The answer to the question—What is the cause of the paralysis?—is usually easy, but in a few cases it is almost impossible to give a definite reply. In such cases, I would say, treat the case as one of aneurism of the aorta. In my experience, I have seen a considerable number of these at first obscure cases, and in the large majority they have proved in the end the accuracy of the statement I have just made.

The remaining class of cases, namely, those where the cancerous formation is situated at the lower end of the œsophagus, has also been well illustrated in the three following cases.

Case VIII. (8)—*Epithelioma of lower end of œsophagus; history of sudden and steadily increasing dysphagia, culminating in almost complete obstruction; gastrostomy in two stages, followed by improvement in swallowing.*—W. H——, a labourer, aged sixty-eight, was admitted into the Glasgow Royal Infirmary on October 7th 1890. He stated that about five weeks previous to admission, he found one day that he was unable to swallow any solid food, although still able to swallow fluid and semi-fluid diet, some articles of food passing into the stomach more easily than others. As a rule, he experienced greater difficulty in swallowing hot

[1] In Case 4, before the patient left the ward, there was complete paralysis of the left vocal cord. See also paper by Drs James Finlayson and Joseph Coats, *Glasgow Medical Journal*, September 1890.

than cold substances. Since the onset of these symptoms, the dysphagia has steadily become worse, so that on admission the patient is greatly emaciated, his weight being reduced from 16 st. to 9 st. 10 lb. Now, if fluid food be swallowed rapidly, or in any quantity at a time, it is ejected with considerable force. There is no evidence of any pouching of the œsophagus above the seat of obstruction, the quantity of food vomited being only what has been last swallowed. On passing a full-sized bougie, an obstruction is met with at the lower end of the œsophagus, which, on further examination, is found to permit the passage of a No. 10 œsophageal bougie. The patient states that he has not suffered pain at any time, nor has he noticed any blood in the vomited matter. There is no history of injury, or of syphilis. In respect to treatment little has to be said, the principal object being to introduce as much nourishment as possible in a concentrated form, both by stomach and by nutrient zyminised suppositories, and enemata. October 27th:—Since admission, the dysphagia has become steadily worse, so that now the patient is unable to swallow more than a few spoonfuls of fluid in the twenty-four hours. His weight is now 9 st. 1 lb. Gastrostomy was therefore performed, from which the patient made a good recovery.[1]

Case IX. (9)—*Epithelioma of the lower end of the œsophagus.*—J. F——, aged sixty-three, came to the Royal Infirmary in November 1890. It appears that he first experienced a difficulty in taking solid food on October 16th 1890, and since that date the dysphagia has steadily increased, so that at present he is only able to take cold fluid food. During this period, his weight diminished from 160 lb. to 130 lb., and he is now very anæmic, and complains much of weakness. He has no morbid sensation in the throat, further than what is produced by regurgitation of food, and sometimes the quantity which accumulates above

[1] Patient progressed favourably during the early summer, and the disease advanced very slowly, but, not receiving proper attention at home, he was found dead in bed, from starvation, in August 1891.

the stricture amounts to more than one pint. When he attempts to swallow food rapidly, or in considerable quantity at a time, it is suddenly ejected with force, and not infrequently flows into the nostrils and larynx. He has never noticed any blood in the vomited matter. On introducing a full-sized bougie, a stricture is detected at the lower end of the œsophagus, through which not even the smallest bougie can be passed. A careful physical examination of the chest fails to reveal any abnormality of the thoracic organs, further than that the action of the heart is feeble, and the pulse numbers from 55 to 65 per minute. The patient was very anæmic, and extremely weak from want of food, and he was advised to come into the hospital immediately, but this he failed to do. Since I examined him he has not been seen by me, as he has ceased to attend the out-door department.

CASE X. (10)—*Acute carcinoma at the lower end of the œsophagus involving cardiac end of stomach; death from collapse.*—H. C——, aged seventy-one, was admitted into the hospital on January 30th 1891. Four months previous to admission the patient enjoyed perfect health, and was able to take his food without the slightest difficulty, but he noticed that his appetite was not so good as formerly, and this want of desire for food continued until the beginning of December, when he noticed for the first time difficulty in swallowing certain kinds of food, such as potatoes, bread, and butcher's meat. At the beginning of the month, the difficulty in deglutition was but slight; the dysphagia, however, steadily and rapidly increased, so that by the beginning of the year 1891 he was quite unable to swallow any solid food, and during the first fortnight of January he had taken nothing but a little sherry negus, and a few spoonfuls of beef-tea occasionally. His ordinary weight was 174 lb., but on admission he weighed only 141½ lb., and considering that his height was 5 ft. 11½ in., he looked very much emaciated. The pulse was firm and strong, and numbered 100 beats per minute. Little or no anæmia, and no pain. On passing an œsophageal bougie an almost complete obstruction was met with close to the stomach. The stricture

was so complete that it was with the greatest difficulty a No. 3 bougie was passed. As a consequence of the extremely weak condition of the patient, and his inability to take food by the mouth, he was fed by the rectum by means of beef peptonoids, peptonised beef-tea, and meat suppositories. Physical examination of the chest gave the following results:—The sounds of the heart were feeble, but there was no evidence of organic disease. Lungs normal. On palpating the abdomen, the liver was found to project downwards beyond the costal cartilages for a distance of about one inch and a half, but on percussion, the hepatic dulness was not found to be increased, and no nodules could be discovered. To the left of the liver the percussion was equivocal, and to the hand there was a marked resistance in the region of the stomach. Other abdominal organs normal. From the circumstance that the obstruction was situated so low down, and was associated with marked resistance in the region of the stomach, which indicated that that organ was involved in the disease, I resolved not to operate, and the patient died in a few days from collapse.

The necropsy showed the thoracic organs to be normal. The liver was found to be displaced downwards and to the left, so that the left lobe overlapped and hid from view the contracted and empty stomach. At the lower end of the œsophagus, and along the neighbouring parts of the stomach, there was a large and wide-spread malignant ulcer, and the substance of the tumour involved the entire thickness of the stomach wall throughout an area of about four inches square, the greater part of which occupied the greater curvature. The tumour was an encephaloid carcinoma. There were no secondary formations.

It is at once obvious that not only the symptoms during life, but also the mode of death, are determined by the situation as well as by the precise nature of the malignant disease. It is clear I think that even a slow-growing epithelioma, if situated in the uppermost part of the œsophagus (as for example, in Cases 3 and 4), will lead to death by starvation sooner than a more rapidly growing tumour situated at the level of the

bifurcation of the trachea, or at the lower end of the œsophagus (Cases 5, 6, 8, and 9). Putting the question of situation of the tumour out of account for the moment, and, other conditions being equal, I think it may be safely said that adeno-carcinoma grows most rapidly, and, if not interfered with, causes death in the shortest time. Epithelioma is less acute, while scirrhous cancer, as shown in Cases 2 and 6, may remain practically stationary for a considerable period. As will be observed by reference to the cases I have used as illustrations, the most prominent and constant symptom is dysphagia, which, as a rule, is at first slight in degree, but gradually and steadily progressive, at first occasional, but afterwards always present. In some cases, on the other hand, the difficulty in swallowing develops suddenly, and is from the beginning severe. This is experienced when the tumour is situated high up, but, if the lower part of the gullet be attacked, in not a few instances the patient complains of severe difficulty in deglutition only after the disease has been shown to exist for some considerable time. The usual experience is that solids, especially bread, potatoes, and butcher's meat, when taken in quantity, fail to pass a certain point in the gullet where the bolus may become lodged, or it may be found necessary to wash down each morsel by a draught of fluid, and even this may only succeed after careful mastication and repeated unsuccessful attempts. The patient may imagine that he has managed to swallow a moderately good meal, when, to his disgust, in a short time the greater part of it wells back into his mouth. This temporary retention of the food is possible only when the œsophagus has become pouched above the stricture. At first the quantity of food so retained is small in amount, and regurgitates almost immediately after it is swallowed; but as time advances the sac may become of considerable size, and capable of retaining large quantities of food. The regurgitation observed in such cases is very different from what is noticed in cases of spasmodic stricture or in ordinary vomiting from the stomach, in so far that the contents of the pouch simply well up, and

resembles the ejection that results from cerebral disease more closely than any other form of vomiting. When ulceration occurs, sometimes the dysphagia is relieved to some extent, but at the same time the vomited matter is no longer simply the food as it was swallowed, but is usually mixed with disagreeable fetid muco-purulent blood-stained materials. About this stage of the disease the patient expectorates quantities of frothy mucus, and the secretions become more and more offensive. Alongside the development of dysphagia, it will be observed that the patient is rapidly emaciating and the blood becoming more and more deficient in colouring matter and in blood corpuscles. The emaciation is generally, but not always, marked. In the Case W. F—— (Case 3), even although he was practically unable to take any food for three weeks before admission, at the operation of gastrostomy there were fully three-quarters of an inch of fat covering the abdominal wall, and the portion of the omentum exposed was noticed to contain a considerable quantity of adipose tissue. The stomach was quite empty and collapsed. But while, in this particular case, the emaciation was not so marked as one would have expected under the circumstances, the condition of the pulse, the temperature, the feeling of extreme weakness, and the tendency to syncope, all showed the effects of starvation.

In most of the cases to which I have referred the patients have not complained much of hunger, except perhaps during the early stage of the disease. In the more advanced cases it is frequently very difficult to get food taken, even although the patient is able to partake of fluids or semi-fluid diet. Partly on account of the dryness of the throat and fetid odour of the breath, but also I believe from a desire that their suffering may soon terminate, the patients may absolutely refuse to take nourishment in any form. Some time ago I had a case where I was feeding the patient very satisfactorily by a stomach-tube, when one morning she intimated that she had had her last meal, and would allow no more food to be given to her in any form; but this was not to

be wondered at, for after each meal she was tortured with severe pain in the epigastrium, due to the collection of large quantities of gas in the stomach, which she was unable to rid herself of.

In very few of the cases which I have seen does the patient complain much of pain during deglutition, unless in those instances where the tumour is situated high up. In these the pain during swallowing is often sharp and burning, and is referred to the ears and side of the neck rather than to the throat. Between meals the pain is less severe, but still present at all times unless when relieved by treatment. When the disease attacks the middle third of the œsophagus the patient not uncommonly states that in the evening or during the night he experiences a feeling of a "load of uneasiness" or even of dull aching pain in the back or in the epigastrium. Should the carcinoma involve the lower end of the œsophagus, the patient seldom suffers from pain either during deglutition or at other times. This absence of suffering in such cases is somewhat remarkable. For example, in the case of H. C—— (Case 10), even although the carcinoma involved the lower extremity of the œsophagus and the cardiac end of the stomach, the patient, on being carefully questioned, stated that he had suffered no pain in the stomach at any time since the onset of the disease.

Respecting the sensation of the stomach, it is rather remarkable that simple ulceration should cause so much distress, while stitching of the stomach, or even perforating its walls with the electric cautery, as observed in the cases of W. F——, Mrs C——, and W. H—— (Cases 3, 4, and 8), should hardly be felt by the patients. The presence of dyspnœa, aphonia, and cough depends upon the position of the tumour. When the upper part of the larynx is involved, obstruction to breathing may be occasioned, as I have already shown, by direct pressure upon the air passages, by extension of the tumour into the larynx, or by œdema, as in Case 4. Again, as a result of involvement of the recurrent laryngeal nerve, paralysis of the muscles of the larynx may be produced and give rise to aphonia

or dyspnœa according to circumstances. The voice may also be impaired or lost as a consequence of the tumour invading the cavity of the larynx. Cough is a very common symptom, and may be caused in many ways—by saliva or food flowing into the larynx or trachea, and there giving rise to catarrh, by the establishment of fistulous openings between the gullet and air passages, or by reflex irritation. Patients affected with carcinoma of the œsophagus, partly on account of their weak physical condition, are very liable to attacks of tracheal and bronchial catarrh, even although there may be no evidence to show that the malignant growth in the œsophagus is interfering with the function of the lungs.

When the growth is situated in the first part of the œsophagus, its situation and its extent may be easily ascertained by palpating the neck or by examination with the finger passed into the pharynx. Should the disease attack the œsophagus at a lower level, in order to gain information it is often necessary to examine the passage by means of bougies. When the bougie—one of large size to begin with—has been introduced into the œsophagus, it should be passed gently, no force being employed under any circumstances. If any obstruction be encountered in the course of the œsophagus, the bougie should be marked at the point in contact with the teeth, then withdrawn, and the distance from the point of the instrument to the mark carefully measured. The surgeon should then introduce a smaller instrument, and so on, gradually going down the scale until he either succeeds in penetrating the stricture or in assuring himself that the obstruction is complete. In cases of cancer of the œsophagus sometimes even the most careful use of bougies may cause injury and slight hæmorrhage. In such instances the employment of instruments should be discontinued, but regarding this point I shall have more to say when we come to speak of treatment.

CHAPTER III.

STRICTURE OF THE ŒSOPHAGUS—*Continued.*

Sarcoma and Benign Tumours, rare—Benign Tumours, Diagnosis—Cicatricial Stricture; Etiology and Pathology, with illustrative cases; Diagnosis—Spasmodic Stricture—General question of Prognosis n Stricture of Gullet—Mode of death—Statistics.

In the last two chapters I discussed fully, and illustrated by cases, the most common and therefore most important variety of œsophageal obstruction, namely, carcinomatous disease. I will now merely allude to sarcoma of the œsophagus, make a few remarks regarding benign tumours, then consider cicatricial stricture, and, subsequently, the general question of prognosis.

Sarcomatous Disease of the œsophagus is very seldom met with as a primary lesion, but frequently the gullet becomes implicated secondarily. This is most commonly observed in sarcoma of the lungs, mediastinal or cervical glands, thyroid gland, larynx, and the vertebræ. Rosenbach has reported a case in which a soft, transparent, and lobulated tumour about the size of a hen's egg was attached to the upper end of the œsophagus on the right side, and this, on microscopic examination, proved to be a small round-celled sarcoma. A case is also recorded by Dr Chapman,[1] and another by Dr Lauriston Shaw.[2] In the latter case the sarcoma appeared as an ulcer with well-defined margins, and, destroying an extensive area of the mucous membrane of

[1] American Journal of Medical Science, 1877, p. 433.

[2] *The Lancet*, March 21st 1891, p. 660.

the gullet, eventually it perforated the posterior wall of the trachea just above the bifurcation.

Benign Tumours of the œsophagus are very seldom met with in practice. It is a remarkable fact, and one not easily explained, that while the pharynx, larynx, and posterior nares are all liable to be occupied by non-malignant neoplasms, the gullet very seldom is. Indeed, benign tumours are so seldom seen in the latter situation that I do not purpose to occupy time by referring to the cases which have been recorded, further than to say that cases of papillomata, cysts, fibromata, adenomata, and lipomata have been published as curiosities, and I have, in the Museum of the Royal Infirmary, a remarkable example of a very large myoma of the gullet. This tumour, as exhibited in the preparation, is situated in the lower part of the œsophagus, its inferior extremity just reaching the cardiac orifice of the stomach. The tumour measures four inches and three-quarters from above downwards, one inch to one inch and a quarter from before backwards, and on an average about two inches transversely. It mostly lies free, but is attached to the posterior wall of the passage by a very thin fibrous band about an inch and three-quarters in length, and with its upper edge about two inches beneath the superior margin of the tumour. The œsophagus, at the part occupied by the tumour, was much dilated, and its mucous membrane presented considerable ulceration. On microscopic examination the tissue was found to be composed of elongated spindle-shaped cells presenting the characters of the smooth muscular fibre cell. The tumour was thus concluded to be a myoma or muscular tumour. With the exception of the œsophagus, all the organs of the body were normal. During life the patient, who was treated by the late Dr Steven in ward 5, complained chiefly of difficulty and pain in swallowing, and these, as he stated, were first experienced about two months before death. There was no actual vomiting, but when an attempt was made to swallow, the food soon regurgitated. During his stay of two months in the hospital, examination

with the bougie detected an obstruction in the œsophagus. The patient, who on admission had a good complexion and was not emaciated, began after a fortnight's residence to lose flesh rapidly, till at death he was extremely emaciated.[1] Again, another specimen, also from the museum, is an example of a simple papilloma of the œsophagus. The tumour is situated on the anterior wall of the gullet, immediately behind the cricoid cartilage, and only involves the superficial structures of the mucous membrane. During life it caused considerable obstruction to swallowing, although it is not larger than half a grape. The patient died of Bright's disease, but for a short time before death he was unable to swallow solid food, and even fluids passed with difficulty.

The *diagnosis* of benign tumours, unless when they are so high up as to be visible, is by no means easy. The slow development of symptoms, the absence of pain, or of involvement of the lymphatic glands, distinguish benign from malignant neoplasms, and the history of the case in respect to injury usually prevents traumatic stricture from being overlooked. When the tumour is situated high up, as in the specimen of papilloma I have just described, dysphagia develops rapidly; while if the growth is situated low down, as in cases of myoma, a compensatory dilatation of the gullet may occur, so that food passes, even although the tumour may have attained an enormous size.

Cicatricial Stricture.—The next form of obstruction to be considered is Cicatricial Stricture of the gullet. When the mucous membrane is injured in any way, either by a wound or by the action of severe inflammation, the abraded surface separates, and granulation tissue fills the vacant space; and as a consequence of the development of the round-celled into more

[1] A full account of this case is given by Dr Joseph Coats in the *Glasgow Medical Journal*, vol. iv., 1872.

highly developed tissue, contraction takes place, and the lumen of the gullet is diminished. I have a specimen which was removed from one of a very distressing group of cases. Three children were left by their mother, and on the table of the house a cream jug was placed, the contents of which the young ones believed to be cream. They divided the contents of the jug equally, and all drank it at the same time. Instead of being cream, the contents of the vessel were a mixture of sulphuric acid and ground pumice-stone used for cleaning brass. Their ages were three, five, and ten years respectively. The youngest child died, but the two eldest recovered.[1] I may say that when the patients were admitted the mucous membrane of the inside of the lips, dorsum of the tongue, and palate had a white appearance, as if burned by a corrosive acid, and the patients were vomiting a thick tarry-looking substance, which had a strong acid reaction. In the fatal case the peritoneal cavity contained several ounces of fluid, which had the appearance of a mixture of chocolate and milk, and was devoid of fæcal odour. The peritoneum also contained a quantity of gas. The stomach had been completely charred and thrown into large irregular folds, and when the slough was removed an eroded and bleeding surface was exposed. The duodenum contained a quantity of coffee-like fluid, but there was no destruction of its mucous membrane. The two other children recovered from the immediate effects of the poison, but subsequently they suffered from stricture of the œsophagus. To these cases I shall refer when we come to consider treatment.

During the session 1891, I had under treatment, in the Royal Infirmary, four cases of cicatricial stricture, and in all of these the contraction has been caused by injury from swallowing chemicals or hot fluids. When the injury is severe, or the poison concentrated, the gullet and stomach may be so destroyed that death results within a few hours. In the first two cases of

[1] The patients were in the first instance admitted into Dr Wood Smith's ward, and I treated the two eldest for cicatricial stricture afterwards.

sulphuric acid poisoning which I saw, the acid was taken in considerable quantity, and in a concentrated form, so that the œsophagus, as observed in the museum specimen, is denuded of its epithelium, and the longitudinal muscular fasciculi are exposed. In both cases death occurred within twenty-four hours. When, however, the injury is less extensive or severe, an acute œsophagitis follows; the destroyed mucous membrane becomes replaced by granulation tissue, and, as healing progresses, the cicatricial tissue contracts. The extent of the stricture depends upon the primary injury. Contraction takes place slowly, so that the usual history of the case is that while the patient suffers severe pain, and experiences great difficulty in swallowing immediately after the accident, within a few days relief comes, and he is able to swallow food easily for weeks. Then the granulation tissue begins to contract, and the patient complains of steadily increasing dysphagia. The stricture may only occupy a small area of the gullet, as in this specimen. Here a portion of the œsophagus is laid open, and a stricture is seen at its centre, where the muscular fibres are very much contracted. The stricture is caused by cicatricial contraction extending through a small area in the long axis of the œsophagus, the contracted portion not including more than a quarter of an inch of the length of the gullet. The walls are normal both above and below the stricture. In other cases the contraction may extend throughout the entire length of the tube, or there may be several smaller strictures. In all cases of cicatricial stenosis of the œsophagus, the most pronounced and characteristic symptom is difficulty in swallowing, but it must be remembered that the closeness of the stricture cannot always be judged by the amount of dysphagia. Not uncommonly, as in the cases of G. R—— and D. M'A——, the organic stricture is accompanied by spasm.

Case XI. (11)—*Cicatricial stricture of the gullet, including whole length of the canal, and at first accompanied by spasm; cure by use of bougies.*—G. R——, aged thirty-one, was first seen by me in

September 1889, and since then he has been coming to the ward regularly to have a bougie passed. The history of the case is very simple and short. About two months previous to admission, that is to say, in the middle of July 1889, he swallowed, by mistake for cream, a tablespoonful of a mixture of caustic soda and lime used for cleaning brass. Immediately after swallowing this, he was seized with severe pain in the mouth, throat, and stomach, and at once vomited the contents of the stomach. For the first fortnight he suffered from the ordinary symptoms of acute inflammation of the œsophagus and mouth, namely, painful dysphagia, dyspnœa, and expectoration of blood-stained mucus and shreds of mucous membrane. When admitted to hospital, the pain was relieved somewhat, although still occasionally present in a paroxysmal form. At this time it was found almost impossible to pass a bougie, partly on account of the suffering which it caused the patient, and partly by reason of spasm induced by the presence of the instrument. For some time he had to be nourished by rectal injections, but after a fortnight's rest to the œsophagus I succeeded in introducing a small-sized bougie (No. 6), and from that time till now, March 1892, he has had instruments passed at regular intervals, and he is thereby enabled to take a good quantity of solid and fluid food; he has regained his normal weight, and follows his occupation. In this case, the obstruction includes the whole, or nearly the whole, length of the gullet, so that in introducing an instrument no localised stricture is detected, but if the patient fails to have a bougie introduced, say, for a month, he is soon reminded of his condition by finding that he is unable to swallow solid food.

In another case the stricture, although caused in much the same way, is very limited in extent.

CASE XII. (12)—*Cicatricial stricture limited to level of bifurcation of the trachea; easy and successful treatment by bougies.*—G. T——, aged forty-nine, was admitted into the Royal Infirmary on September 10th 1890. Eight months previous to admission he

swallowed a small quantity of caustic soda solution, which was vomited immediately, but nevertheless he suffered soon after from a very acute attack of œsophagitis, and from that time till admission, dysphagia steadily increased, so that he could only take fluid or semi-fluid food. On introducing a bougie, a distinct and well-defined stricture could be made out at the level of the bifurcation of the trachea. The treatment resorted to was gradual dilatation, which was so successful that by the end of the year the patient only required an instrument passed once a month in order to enable him to swallow with perfect ease. When seen in March 1892, the patient enjoyed perfect health, and has not had a bougie passed for three months; stricture completely disappeared.

CASE XIII. (13)—*Stenosis extending from level of larynx to bifurcation of trachea. Cure by gradual dilatation.*—D. McA——, aged fifty-one. He was admitted to the ward on January 20th 1891, complaining of great difficulty in swallowing, of seven weeks' duration. He states that seven weeks previous to admission he swallowed by mistake for whisky a burning liquid said to be vitriol. Indeed he had been in the habit, as a railway porter, of seeking for whisky in "returned empties," and on that particular occasion he failed to distinguish the nature of the contents of the jar until it had burned his throat, tongue, and mouth so severely that, as he says, " a skin peeled off those parts." Immediately on finding out his mistake he swallowed a large quantity of cold water, which was at once vomited, and he describes the vomited matter as being very acid in taste and consisting of "phlegm and a skin." For a fortnight after the accident he suffered from acute inflammation of the mouth and œsophagus, and the only food he took was milk and soda-water. On admission he was able to take semolina and milk, but was quite unable to swallow any solid food. On passing a bougie a long narrow stricture was found, extending from the level of the cricoid cartilage to the bifurcation of the trachea. The introduction even of a small instrument was attended with

great pain and spasm. The patient was therefore fed exclusively per rectum for ten days, no food being given by the mouth, and no instruments were introduced during that time. After rest for these ten days a successful attempt was made to pass a No. 8 bougie, and two days thereafter a No. 9 was easily introduced, and so on; every second day a larger size was passed until a No. 17 was got through the stenosis. By this time the patient was able to take solid food with freedom, and was soon after dismissed, but he continued coming to the hospital once a week to have a bougie introduced. Gradually the intervals between the passage of bougies was increased, till now (March 1892) he only requires to have an instrument passed once in six weeks.

The *diagnosis* of organic stricture is usually easy. In this disease the points to be considered are similar to those mentioned in discussing the diagnosis of cancer of the gullet. The history of injury, followed immediately by painful deglutition, which after a few days or weeks passes off, and is, at a more remote date, followed by a steadily increasing dysphagia, unassociated with pain, hæmorrhage, or enlargement of lymphatic glands, points to organic stricture. In many cases, however, a clear history cannot be made out. The patient may have injured himself while under the influence of alcohol, during an attack of insanity, or for suicidal purposes, under which circumstances no definite history can be got, or the injury may have been received so long before as to have passed from the memory of the patient. Again, it must not be forgotten that injury may lead to carcinoma, as well as to cicatricial stricture, but as a rule it is protracted irritation—for example, the repeated swallowing of strong alcohol—that brings on malignant disease, whilst transitory and severe irritation produces a cicatricial stenosis. The absence of pain, of hæmorrhage, and of enlargement of the lymphatic glands are, as a rule, most important indications that the stricture is traumatic rather than malignant. But while this is so we not unfrequently meet with cases of carcinoma where, during almost the entire course of the case, not one of those symptoms is present. The

history of the case, the age of the patient, the character of the dysphagia and of the discharges, usually lead to a correct diagnosis.

Tertiary syphilitic disease may cause dysphagia either by the formation of a gumma or by the contraction of an old cicatrix.

Case XIV. (14)—*Syphilitic stenosis of gullet developed over twenty-nine years after primary disease (chancre). Cure by specific treatment.*—Two years ago (1890) a gentleman came from New Zealand to consult me regarding a marked difficulty he had in swallowing, and on inquiry I found that the dysphagia had developed slowly and steadily during the previous five months, and was unassociated with pain except in swallowing. There had not been any hæmorrhage, and until recently he had been able to swallow semi-solid food. On examination I found a swelling behind the larynx, which pushed that structure forwards and to the left side, but did not interfere much with respiration or phonation. On passing a round No. 10 bougie, a distinct obstruction was found behind the larynx, but the growth seemed to me to occupy the posterior wall of the gullet only. This circumstance made me inquire more carefully into the history of the patient, who informed me that he married immediately before leaving this country twenty-five years ago, that he had a large family, and that he had always enjoyed perfect health. After much difficulty I succeeded in collecting facts which proved to me beyond doubt that four years before emigrating he suffered from a hard chancre, but after the first eighteen months he suffered from no constitutional symptoms until the growth in the œsophagus formed, which I diagnosed to be a gumma. The patient was placed upon mercury and iodide of potassium, and within six weeks the growth disappeared. This is the only case of syphilitic disease of the œsophagus I have seen.

Spasmodic Stricture.—Only a few words require to be said regarding Spasmodic Stricture of the gullet. This disease is neither so serious nor so common as the lesions we have been considering up to the present time. I have not seen a pure and simple case of

spasmodic stricture of the œsophagus during the year 1891, but I have observed two cases in which cicatricial constriction was associated with contraction of the muscular structures. And here I may observe that I question very much the existence of spasm of the fibres of the muscular coat in an otherwise healthy œsophagus. In the examples of this disease which I have had the opportunity of observing, the lesion seemed to me to be very similar in its pathology to spasmodic stricture of the urethra; that is to say, the spasm was partly induced by undue local irritability, and partly by the temperament of the individual.

CASE XV. (15)—*Spasmodic stricture of the œsophagus, variable in degree, usually occurring at the end of a meal, and due to a little inflamed area; cure.*—In February 1890, a very instructive and interesting case came under my notice. A man about twenty years of age consulted me, and stated that six weeks previously, while dining with a friend, a spoonful of soup which he had swallowed was suddenly and forcibly ejected from his throat; on again trying to swallow, he found it impossible to take either fluid or solid food, but in the course of the evening he was able to enjoy a good meal, without any difficulty in swallowing. From that time till I saw him he complained of more or less dysphagia every day. On some occasions it was slight and could be easily overcome, while on others he experienced a complete inability to take any kind of food, or when he did succeed in forcing diet into the œsophagus, the bolus was immediately expelled with considerable force. He found that when he took food in company with others that he was more likely to suffer from dysphagia than when he took his meals alone. These attacks as a rule came on towards the end of a meal. When I saw him for the first time he was much excited, so that it was with the greatest difficulty I made a satisfactory examination. On passing a large and firm bougie, I found it could be easily introduced into the œsophagus; but when it reached a point ten inches and a half from the teeth it met

with a very marked obstruction, which, however, was overcome by steady and continued pressure. At a subsequent visit I introduced a small-sized gum elastic instrument. It detected an obstruction at the same point, but immediately the bougie was ejected and thrown into a coil in the pharynx. I then passed a larger and firmer bougie, and as soon as it reached the obstruction I released my hold, when the œsophagus forcibly and quickly contracted so as to throw the instrument out of the patient's mouth. The man was then placed under chloroform, and an examination was made with the electric œsophagoscope, when I found at a point corresponding to the site of obstruction an inflamed area about an inch in length, but free from ulceration. I kept the patient in bed, and directed that he should have only barley water, milk, and soup by the mouth, supplemented by nutrient enemata. Within three weeks he could swallow without any attack of dysphagia; on the twenty-ninth day after the treatment was commenced, I could pass a full-sized bougie without finding any obstruction, and since then the patient has enjoyed perfect health.

Spasmodic stricture is not frequently observed in men; as a rule it occurs more commonly in the female. This disease is frequently met with in young women between the ages of twenty and thirty; but it may be seen in persons under these ages and also later in life. It is said to be associated with nervous affections, such as epilepsy, chorea, hysteria, or with dyspepsia, intestinal worms, tetanus, hydrophobia, and sexual hypochondriasis, or it may be induced by uterine and ovarian disease, or associated with gout and rheumatism. Therefore observe that it is not only necessary to consider the symptoms of local disease, but it is also imperative to inquire into the general health of the individual, and determine whether the patient is the subject of any other affection likely to induce, either directly or indirectly, spasm of the gullet.

The statements of patients suffering from this disease must be received with caution, as they almost always greatly exag-

gerate their suffering; and although they inform you that they have been unable to swallow any food for days or weeks, they almost invariably are well nourished, presenting, therefore, a very different appearance from those who are affected with organic or malignant stricture. While by themselves, such patients usually succeed in taking a good meal, but if watched, or even in the presence of others, they fail to swallow food. From what has been already said one can have little difficulty in distinguishing this disease from those previously brought under notice. The symptoms occur in excitable subjects, the dysphagia comes on in paroxysms usually in the middle or towards the end of a meal. Food is regurgitated with force immediately after swallowing, the point of obstruction varies from time to time, and when a bougie is passed and steady pressure exerted the stricture is overcome, or the instrument, if relieved, is forcibly ejected; there is no emaciation or cachexia; pain is not complained of as a rule, unless when a bougie is being passed, nor is there any enlargement of lymphatic glands.

Having considered the various diseases, and the methods of distinguishing the one from the other, I may now discuss the general question of *prognosis* in cases of stricture of the œsophagus. The prognosis in cases of carcinoma depends upon the nature and situation of the disease. If no operation be performed for the relief of the patient, then the great probability is that he will die from starvation, sooner or later according to the situation of the primary disease. When the tumour originates in the upper part of the gullet, complete dysphagia may develop within a few weeks of the onset of the first symptoms, and the patient may succumb after only perhaps two months' illness. On the other hand, carcinomatous disease of the lower end of the gullet may run a very slow course, so that the patient may live for many months. Again, cases of scirrhus are as a rule more chronic than those of epithelioma or soft cancer; and,

indeed, the progress of the first-mentioned variety of cancer is far from rapid. In some instances—as, for example, in Case 8—considerable improvement may take place as a result of rest to the parts after gastrostomy, the rest permitting inflammation and spasm to subside, or, as in Case 5, the power of swallowing may improve as a consequence of ulceration and sloughing of the tumour. When the latter condition is developed new dangers present themselves, namely, rupture of the œsophagus into the surrounding parts. Cases have been recorded where communications have been established between the gullet and posterior mediastinum or peri-œsophageal adipose tissue in the neck, where inflammation of a more or less serious character has resulted therefrom. But in the great majority of instances, on account of the chronic local irritation, adhesions form, which unite the gullet to the neighbouring organs. For example, in the cavity of the thorax the œsophagus may become bound to pericardium, pleura, air passages, or to the great blood-vessels, into any of which structures rupture may take place. I have already mentioned an instance (Case 5) where rupture occurred into the aorta, and resulted in fatal hæmorrhage, and death may be caused by a communication being established between the œsophagus and the air passages. In a specimen I have, the epithelioma occupies the œsophagus at the level of the bifurcation of the trachea, and led to acute inflammatory changes in the lungs, the apices of which were softened and completely destroyed, while the pleuræ were adherent. A second case is very similar. The tumour occupies the same position. The œsophagus is completely destroyed by gangrene for a distance of about two inches, and the left lung was, at the post-mortem examination, found to be also gangrenous. A third case is one of special interest, as the first stage of gastrostomy was performed just previous to the occurrence of rupture.

Case XVI. (16).—*Epithelioma of the gullet at level of bifurcation of trachea; gastrostomy followed by perforation of trachea by tumour; bronchitis, and death from collapse.*—The patient, H.

P——, aged sixty-six, a warper, was admitted into the Glasgow Royal Infirmary, on May 18th 1888. He stated that about six months before admission he became affected by a cough, which was spasmodic and very irritating, but not associated with much expectoration. Up till the time of admission this cough had been present without cessation, and during the last three months the patient has had considerable difficulty in swallowing. This dysphagia has daily increased. At first he experienced difficulty in swallowing solids, and afterwards in swallowing semi-fluid food, but now even simple fluids, such as milk or soup, pass into the stomach with difficulty. The patient has always enjoyed good health, has not suffered from specific disease, nor does he know of having sustained any injury to the gullet. On passing a bougie into the œsophagus an almost complete obstruction was discovered fourteen inches from the teeth. On account of the situation of the stricture, namely, opposite the bifurcation of the trachea, it was considered advisable to make a critical examination of the chest, in order to discover whether or not the obstruction might possibly be due to the pressure of an aneurism. I asked my colleague, Dr Gemmell, to make a physical examination, and he assured me there was no positive evidence of aneurism. I then endeavoured to pass a small-sized bougie, and after some difficulty succeeded in pushing a No. 8 through the stricture. On June 13th, the difficulty in swallowing had so increased, that it was evident that unless a radical operation were performed the patient would speedily succumb. After a consultation with my colleagues, it was agreed that gastrostomy should be performed immediately. I therefore operated in the same manner as in the foregoing cases, and nourished the patient by nutrient enemata and suppositories. After the operation the patient was able to swallow small quantities of milk without much difficulty. During the first twenty-four hours he seemed to gain strength, but on the second evening it was noticed that when he swallowed milk or other fluids they immediately caused an attack of coughing, during

which the food was expectorated. This change suggested rupture into the trachea, and prevented the administration of food by the mouth. On the third day after the operation symptoms of acute bronchitis developed, and the patient was so weak that little hope was entertained of his recovery, and on the fourth day he died from collapse, associated with considerable difficulty in breathing. At the post-mortem examination an epithelioma of the œsophagus was found at the level of the bifurcation of the trachea. The surface of the growth was slightly irregular, and its lower and upper margins overlapped the healthy mucous membrane. The œsophagus was firmly adherent to the aorta, to the trachea, and to the bronchial tubes, and there was a rupture large enough to admit the little finger between the gullet and the left bronchus. The perforation was evidently of very recent origin, its edges being soft, irregular, and sloughing. No secondary formations were discovered.

A specimen was placed in the Museum of the Royal Infirmary by my predecessor, the late Dr David Foulis. It is one of epithelioma of the œsophagus ulcerating into the right pleura. The preparation shows the lower part of the œsophagus, the cardiac orifice of the stomach, and a portion of the liver. The lower part of the œsophagus is occupied by a tumour which involves the entire circumference of the tube, and presents an extremely irregular and somewhat warty surface. The tumour occupies about three inches and a half of the length of the œsophagus, its lower margin being about two inches above the cardiac orifice. But just beneath the lower termination of this main tumour there is an isolated globular mass (seen in section) which projects into the tube, and is attached by a comparatively narrow base. Towards the right side, the surface of the chief tumour presents ulceration, and here a direct communication exists with the right pleura. In the specimen, a portion of the pleura is preserved, and the aperture is shown, the pleura being held on the stretch by a piece of whalebone. On examining

this pleura, before any of the contents of the chest had been disturbed, it was found to contain a grumous fluid with the sour odour of the contents of the stomach, while the surface of the membrane was coated with soft fibrine. The tumour in the œsophagus presented the structure of epithelioma, and the same form of disease was found in numerous lymphatic glands. The liver and the kidney also contained a few secondary formations. The history of the case, which was treated by Dr Perry, shows that symptoms of difficulty of swallowing and pain began about five months before death. A violent pain attacked the right side of the chest two days before death, and auscultation detected the usual signs of pleurisy.

These cases illustrate sufficiently the mode of death otherwise than by starvation. I have, however, collected the statistics of 566 cases of carcinoma of the œsophagus, with the following result respecting the cause of death :—

Collapse and exhaustion, . . .	390
Inflammation of lungs, including gangrene,	91
Pleurisy, ...	53
Peritonitis, ...	17
Perforation into heart or blood-vessels, .	15
	566

The *prognosis* in benign tumours of the gullet depends upon the position, size, and rapidity of growth of the neoplasm, and whether or not it can be removed by operation. When situated high up it may be cut off or ligatured, or if pedunculated and soft, the parasol-probang may dislodge it. But should the tumour be situated so as not to be capable of removal, then, in expressing his views as to the prospects of the patient, the surgeon must consider the situation of the growth, and whether or not it is likely to interfere with other functions than those of swallowing. When the growth is slow, compensatory dilatation of the œsophagus usually occurs.

The *prognosis* in cicatricial stricture of the œsophagus depends

upon the extent of the stenosis, and the period at which the patient is seen. Unfortunately, the tendency is for patients to delay seeking advice till the gullet is almost completely closed, and then not infrequently the obstruction is so great that it is almost impossible to dilate with bougies. The most difficult cases to deal with are those of intended suicides who have swallowed strong mineral acids. In such instances, the patients delay asking advice till the very last, and usually the injury is very extensive, and the stenosis intractable. When the poison is taken by accident, the quantity swallowed is usually much smaller, and the stenosis more limited. Before forming an opinion regarding the ultimate result, investigation should be made as to whether there is more than one stricture, and if there are more than one, the situation of each must be ascertained. When a bougie, even a small one, can be passed, the chances of ultimately dilating the stricture are considerable, but if no instrument can be got through, the danger to life is very great. When it is ascertained that the organic stricture is incurable, then resource must be had to gastrostomy. It is in these cases that this operation is most successful, if performed sufficiently early. Cicatricial stricture may exist for many years before the patient succumbs to inanition. The narrowing of the gullet may take place slowly, and in order to overcome the greater difficulty in swallowing, a gradual hypertrophy of the muscular fibres occurs above the constricted point. Therefore, the muscular force being increased, the patient may succeed in taking nutriment through a very small passage.

CHAPTER IV.

STRICTURE OF THE ŒSOPHAGUS—*Continued.*

Treatment; Gradual Dilatation, Food and Feeding Tubes, Forcible Dilatation, Tents, Electrolysis, Internal and External Œsophagotomy.

The *treatment* of stricture of the œsophagus must rest upon an exact appreciation of the pathology of the lesion we have to deal with. When the obstruction arises from the contraction of a cicatrix, or from spasm of the muscular fibres, or from a combination of these causes, then we are justified in attempting dilatation. This may be done in five different ways—(1) by gradual dilatation, (2) by forcible dilatation, (3) by the action of tents, (4) by electrolysis, and (5) by internal œsophagotomy. The object the surgeon has in view is to dilate the stricture, and to maintain the lumen of the gullet. It is only in so far as he succeeds in doing this that his treatment can be recommended.

I shall now discuss the relative value of the various methods I have just mentioned, and in so doing we must consider the *rationale* of the treatment. When a cicatricial stenosis exists we have a double object in view, first to dilate the stricture, and second to promote absorption of the inflammatory tissue. The passage of bougies does both when properly used.

I may answer the questions, What is dilatation, and how should it be employed? It is a mechanical process of stretching the ring of organised inflammatory connective tissue which surrounds the œsophagus, and which occasions the stenosis,

and also a means of promoting absorption of the newly formed tissue.

Take for example a case, one in which the history points to injury and subsequent constriction of the gullet. The patient has considerable difficulty in swallowing, as for example in Case 13. We begin by passing a large-sized bougie, and gradually go down the scale until we succeed in getting an instrument through, then retain it for five, ten, or fifteen minutes, according as the patient can allow. We tell him to return in three days. Suppose on the first occasion we succeed in passing a No. 6, then on the second visit we begin with a No. 5, and follow with a No. 6, 7, and 8 if possible. We simply introduce the smaller sizes, but retain for as long a time as possible the largest bougie passed. Then on the third visit we begin with an instrument a size smaller than the largest one passed at the second visit, and so on until a No. 15 or No. 16 can be introduced with ease. In some instances, as in Cases 11 and 13, the pain and spasm induced by the presence of a bougie are so great that the treatment requires to be discontinued, and the œsophagus allowed perfect rest by giving nourishment entirely by the rectum. During the early attempts the passage of an instrument almost always excites coughing, and stimulates the secretion of mucus and saliva, so that the patient experiences considerable difficulty in retaining the instrument. But if the bougie be well softened in warm water and the patient instructed to throw the head forwards without bending the neck, the secretions will flow from the mouth. After a time he becomes accustomed to the use of instruments, and can retain them for a considerable time. To begin with, the operation should be repeated every third day, and gradually as the lumen of the gullet becomes increased the interval may be prolonged. It must be remembered that the introduction of an instrument of any kind is a source of irritation, and, especially if too large a bougie be forced through, it is apt to cause inflammation of the stricture and spasm. Now this is exactly what we must avoid —no force is to be used, there is no hurry. Every case must be

treated according to its individual circumstances. In some, rapid progress may be made; in others we must be content with but slight improvement from time to time. Indeed, sometimes the same size of instrument may be required from one day to another. The question may be asked, How are we to be guided with regard to the size and kind of bougie to employ? If after an instrument has been passed with gentle pressure it is grasped more tightly for some minutes, and to withdraw it is painful to the patient, then do not attempt any more that day, because it is evident that the bougie is exciting irritation and inducing spasm of the muscular fibres. To pass a larger size would only do harm. Then as to the kind of instrument. Those which I find most useful are gum elastic bougies of uniform size from end to end, and oval on section. Tapered instruments should never be used, as by their employment the operator cannot judge the amount of force he is employing. The same argument holds good against railway or oversliding bougies. I have discussed the subject of gradual dilatation at length, for I consider it to be the safest and easiest method; the one which should be first used, and persevered in until we either penetrate the stricture, or are convinced that it is impermeable, Force must never be used in the introduction of an instrument through the stenosis. Force in the treatment of this evil, as in that of many others, is no remedy. It is very difficult for me to say how much pressure to employ, but it can be easily understood, that the œsophagus may be of normal size right up to the opening in the stricture, and that the real difficulty is in finding the orifice. The more difficult this is the less should we desire to use force; for instead of penetrating the stricture, the probability is that we will cause the point of the instrument to perforate the wall of the gullet. It requires not force, but care and patience, to insinuate the bougie through the small orifice, and this can only be done by systematic use of the instrument, and not by groping at hazard on the chance of entering the tiny opening.

It is now my purpose to discuss the treatment which should be

adopted in individual cases, and I presume that those described in these pages afford sufficient material for consideration. Some of these permitted of only palliative treatment being employed, while in other instances an operation was deemed justifiable.

Let us now consider in detail the treatment employed in these seven cases of malignant disease. In three cases (5, 9, and 10) palliative treatment only was employed, while in cases 3, 4, 6, and 8, gastrostomy was performed. Whatever may be done in such cases, two objects are constantly held in view: to give the patient nourishment in the most convenient way, and to alleviate pain. Local treatment is of no avail, unless in a few exceptional cases.

During the early stages of stricture, that is to say, at a period when the patient is able to take a reasonable amount of food, the diet should be highly nutritive, and in no way irritating. The staple articles of diet must be soup, milk, eggs, pounded meat, and farinaceous food. I may now say a word or two as to how these should be prepared. Beef-tea, so-called, and extracts of meat are not so nutritious as is generally believed. At the Royal Infirmary we have a preparation called "composite soup." It is prepared by stewing at a temperature of 200° F., for six hours, two pounds of hough meat,[1] one chicken, and a knuckle of veal, in two quarts of water without salt. When allowed to stand in a cold place for six hours, the fat rises to the surface, and forms a hard cake, while the soup forms a jelly. The fat, if desired, may be removed, and the jelly may be given either cold, or heated and taken as soup.

In regard to the use of milk and eggs, the less these are cooked the more easily are they assimilated. If digestion be imperfect, these, as well as other articles of diet, may be artificially digested before they are given to the patient. Patients suffering from stricture find great difficulty in swallowing ordinary bread, as well as other farinaceous food. When loaf bread is masticated, it forms a pulpy mass, on account of the gluten which it contains,

[1] The joint on the hind leg of an ox, corresponding to the ankle-joint in man.

and for this reason, any one who has difficulty in swallowing complains first of inability to take soft bread. But if the starch be freed from the gluten before the bread is made, as is done in the manufacture of Indian corn flour, the saliva mixes freely with the starch granules, and the morsel, instead of forming a doughy mass, gradually, as it were, melts away in the mouth, and is easily swallowed, even without the patient taking fluid. Indian corn flour, baked into what is known as "snow cake," is easily swallowed, even in advanced cases of stricture of the gullet. The nurse in the ward prepared these very carefully, and some patients who had been unable to swallow loaf bread for weeks took these cakes eagerly.[1] As long as the patient can swallow easily there is no necessity for passing bougies, unless, of course, for diagnostic purposes. When the stricture becomes so narrow as to require the employment of the feeding-tube, the time has certainly arrived to consider the advisability of performing œsophagostomy or gastrostomy. There are, however, some exceptional cases in which a feeding-tube may be of advantage, namely, those in which, together with organic stricture, the gullet is narrowed by spasm of the muscular fibres immediately on the introduction of any substance into the passage. In these cases, the administration of repeated small doses of cocaine before meals gives considerable relief. But if this treatment proves inefficient, the patient must be placed under chloroform, and food given by a tube. This mode of feeding can necessarily only be continued for a very short time, but sometimes, within a few days, the tendency to spasm diminishes, and artificial feeding is no longer required. The use of the tube in cases where a fistula has formed between the œsophagus and trachea is of very doubtful benefit. In such instances, it is preferable to employ rectal alimentation, with the food properly digested before introduction.

In malignant stricture, the situation of the obstruction having

[1] Ingredients :—Patent corn flour, 1 lb. ; pounded white sugar, ½ lb. ; white of six eggs ; flavour to taste.

been determined by passing a bougie, and the diagnosis completed, instruments should not be passed for the purpose of dilating. As soon as the passage of fluid food becomes difficult, a small, soft, flexible tube should be introduced into the gullet, if possible, through the nose, and retained. For the first few days the patient may complain of discomfort, but very soon both the œsophagus and the stomach come to tolerate the presence of the tube, through which he may be fed regularly. It is, however, advisable to withdraw the tube for twelve hours every third night, that is to say, unless there is considerable difficulty experienced in introducing it. I may say, further, it is not necessary that the tube should be introduced into the stomach; all that is required is that it should pass beyond the stricture.

The employment of a feeding tube should always be resorted to before any operative interference is contemplated. Dr Krishaber has strongly advocated the indefinite retention of these instruments, which, he says, may be tolerated by the patient for a very considerable period. In my experience, they cannot be borne when kept in continuously, but, if removed for a few hours at short intervals, they may be of great service. In the profession there is doubtless a strong feeling that the patient runs a considerable risk in the passing of tubes for malignant stricture. It is true that hard gum elastic tubes or bougies, carclessly or forcibly used, may lead to very serious consequences, but if soft instruments are employed, and the surgeon bears in mind that it is his duty not to force a passage, but by patient, careful and gentle manipulation to guide the tube through the stricture, then little is to be feared.

In two private cases of malignant stricture, both epitheliomata, I have employed with a satisfactory result a method first proposed by Dr James Charters Symonds in 1885.[1] When a tube is passed through the mouth or nares it is liable in some instances to cause pharyngeal or laryngeal irritation, and give

[1] Clinical Society's Transactions, vol. xviii., p. 155.

the patient much distress from his being required constantly to expectorate saliva or mucus during day and night; but by employing the following method these difficulties are to some extent obviated. In place of passing a long tube a short one is substituted, which keeps only the stricture open, and does not cause general irritation of the canal. The idea is to insert a small funnel-shaped tube into the stricture, and to retain it there as long as possible. The method I employed was to pass an ordinary œsophageal bougie and measure the lumen of the stricture. This being determined, I had a soft vulcanite tube made of a proper size, and so shaped that its upper end could be fitted on to the point of the bougie. The funnel-shaped tube was introduced through the stricture on the point of the bougie, the bougie was then withdrawn, and the little tube was left in the stricture. The lower extremity of the small tube was bulbed slightly, with the object of fixing it in position, and to the rim of the upper or expanded end a number of silk threads were attached; these joined together, formed a cord, which was brought out through the mouth and fixed to the right ear of the patient. In both cases the stricture was kept open for a considerable time, but in the end it was found impossible to introduce those little tubes, and as no bougies could be passed, and neither of the patients would allow gastrostomy to be performed, the usual result of cancer of the gullet followed.

Rupture of cicatricial strictures by forcible dilatation is a method of treatment proposed by some surgeons who have been tempted by the rapidity and facility of gaining their immediate purpose. The results have been less severe than might be expected, although in some instances serious effects have followed. When relief is afforded it is immediate, but unless bougies be passed at regular intervals its duration is brief. The reason of this is very evident. No sooner has the cicatrix been ruptured than it begins to heal, and within a very short time the stenosis is as firm as before the operation was performed.

A method I used in treating stenosis of the larynx is also

applicable to stricture of the œsophagus.[1] When it is found impracticable to relieve the cicatricial stricture by gradual dilatation with bougies, I have attempted to slowly stretch the constricted part by inserting a tent made of tupelo wood. A bougie which can be easily passed through the stricture is taken and divided three inches from its point. Between the two divided parts a tupelo wood dilator—the same size as the bougie, and two inches in length—is inserted, and firmly fixed on a copper wire. On the upper end of the wood, where it joins the bougie, a bulb is made of celluloid; so that we have an instrument, the first three inches of which is gum elastic, the following two inches tupelo wood, the upper end of which is covered by a small ball of celluloid, while the remaining part of the instrument is an ordinary bougie. The patient having had the pharynx sprayed with cocaine, and swallowed a little of it, the instrument is introduced until the celluloid bulb rests upon the upper margin of the stricture. The expansion of the tupelo wood takes place by absorption of fluid through its transverse section only. On this account the increase in the bulk of the tent is slow, and the upper end being embedded in celluloid the dilator ultimately assumes the form of a solid cone, and thereby may be easily extracted. Three hours are sufficient time for the tent to expand to twice its original bulk, when it may be withdrawn, and in the course of four or five days a larger size of dilator may be substituted, and so on until the œsophagus is sufficiently distended. This method of treatment is only applicable to cases not dilatable by bougies in the ordinary way.

In two cases I have found it of great value. These two cases were previously treated by electrolysis, at a time when this mode of treatment was being advocated for the relief of stricture of the urethra, with the hope that the electrolytic action might gradually produce a softening of the cicatricial tissue. The idea in using electricity in this way is that the

[1] *Glasgow Medical Journal*, October 1888.

current produces increased activity in the tissues, and causes a rapid change towards health; but the precise vital or chemical changes produced in electrolysed tissue are still unknown. However, to give the method a trial, I extemporised an œsophageal electrode.

The way to employ this treatment is as follows:—The negative pole of the battery is connected with the œsophageal electrode, whilst the positive is held in the patient's hand, and in order that the exact strength of the current may be estimated a galvanometer must be introduced into the circuit. At the commencement of the sitting the current employed may be equal to five milliampères, and this should be steadily increased to ten milliampères, if the patient does not complain of pain. Ten minutes' application is as much as should be employed at one time, and it may be repeated every fourth or fifth day. Care must be taken that the current be not reversed during the operation, otherwise considerable pain may be occasioned, or even bleeding from the œsophagus. During the time the bougie electrode is in the œsophagus gentle pressure should be employed, so as to make it traverse the stricture and as soon as this is done the current may be stopped. My experience of treatment by electrolysis is too small to permit me to confidently express an opinion of its value, but from what I have seen I came to the conclusion that it caused considerable irritation, and probably did more harm than good. So, rather than experiment further with patients suffering from œsophageal stenosis, I have been carefully watching the results of the treatment by electrolysis of other more accessible diseases, and as far as I can learn they are not very encouraging.

The last method I will describe for relieving the stenosis by an operation from within the gullet is that of internal œsophagotomy. Probably on account of the success which has attended the performance of a similar operation for stricture of the urethra, surgeons have been encouraged to divide the obstruction in the

gullet by an incision, but the results have been by no means satisfactory. The operation is performed by an œsophagotome, which consists of a gum-elastic bougie, carrying a wire, to the end of which a knife is attached; by pressing a button, the knife is protruded at will. The curved tube with the knife concealed is passed beyond the stricture, after which the knife is protruded so that it cuts through the stricture on withdrawal of the instrument. In this operation the incision is made from below upwards; in some instances, however, where the œsophagotome could not be passed through the stricture, attempts have been made to divide it from above downwards, but such a procedure is highly dangerous, and should in no instance be practised. The circumstances which call for internal œsophagotomy are very exceptional, and to my mind hardly exist. Although it has been performed for malignant and tubercular diseases, I do not think any one should, on the chance of gaining temporary relief, submit a patient to the dangers attending the operation. Again, in cicatricial stenosis, internal œsophagotomy can be employed only in cases where a bougie of a good size can still be passed, and therefore in a class of cases in which gradual dilatation with bougies or tents might still be used without risk. When I think of the cases which have been described in the preceding pages, and when I recall those which have come under my observation, I cannot say that I remember a single instance in which I would feel justified in having this operation performed. When the stricture is situated a little above, at, or below the bifurcation of the trachea, the dangers of cutting right through the thin œsophagus, and of injuring the trachea and aorta, or of opening into the posterior mediastinum, are very considerable. Of thirty-two cases where this operation was performed which I have inquired into, nineteen were afforded a more or less permanent improvement, nine died from the immediate, and four from indirect results of the operation, so giving a mortality of a little over 40 per cent.

Within the last few years another operation has been proposed and practised by Gussenbauer, von Bergmann, and Sands—namely, external œsophagotomy, afterwards dividing the stricture from within, and subsequently allowing the fistula in the neck to heal spontaneously. This operation can only be employed when the stenosis is situated high up; but, on the other hand, when it occupies the lower end of the tube, the stricture has been dilated from below after a preliminary gastrotomy. This operation, said to have been suggested by Schede, has been performed by von Bergmann, Billroth, Studegard, Frittini, Catani, and Loreta, and most of the cases have been successful.

CHAPTER V.

STRICTURE OF THE ŒSOPHAGUS—*Continued.*

Treatment by External Operations—Œsophagostomy and Œsophagectomy—Gastrostomy.

Œsophagostomy, or the establishment of a fistulous opening in the neck for the relief of stenosis of the gullet, was first suggested in 1645, but on account of the obstacles to performing such an operation without anæsthetics, and probably also from the erroneous belief in the dangers and difficulties in its execution, surgeons were deterred from adopting it until 1738, when it was for the first time successfully performed. The whole subject has been very fully discussed in a valuable and exhaustive monograph by Terrier.[1]

While twenty years ago, or even at a more recent date, œsophagotomy was looked upon as very dangerous, more recent experience has demonstrated that it is not only quite a legitimate surgical procedure, but, under favourable circumstances, one of very high value, when resorted to for the removal of foreign bodies only. I cannot here refer to those instances in which œsophagotomy has been employed for the removal of foreign bodies further than to show that a consideration of the statistics up to the present day gives most encouraging results. Dr T. M. Markoe, in the *New York Medical Journal* of May 1st 1886, says, referring to cases in which œsophagotomy was performed for the removal of foreign bodies: "I am indebted to my friend

[1] De l'Œsophagotomie Externe, Thèse de Paris, 1870.

Dr S. W. Gross of Philadelphia for the following statement, which he very kindly gleaned for me from his abundant statistical resources. The whole of the persons operated upon up to date (1886) is eighty-two. Of these cases, sixty-three were successful, and nineteen followed by death; of the eighty-two cases, the foreign body was found and removed in seventy-four, and of these fifty-seven recovered and seventeen died. The foreign body was not found in seven cases, and in one case it was found but slipped into the stomach and passed per anum. . . Of the sixteen fatal cases of œsophagotomy, eight are stated to have died of abscess provoked by the lodgment of the foreign body, two from exhaustion, two from septicæmia, one of pneumonia, and the rest not clearly stated."

The operation of œsophagostomy for malignant disease is only suitable when the disease is situated in and limited to the upper few inches of the gullet, and where there is evidence that firm adhesions have not formed between the œsophagus and neighbouring parts. In some cases the stenosis is so complete that it is very difficult to introduce the point of a knife into the lumen of the tube; and, moreover, although it is easy to determine the upper limits of the stricture, it is seldom possible to make out where the lower margin is. Mr H. A. Reeves, in the Transactions of the Clinical Society of London, vol. xv., p. 32, gives the following as his conclusions:—"1. That internal œsophagotomy being out of the question, and the stage for gradual dilatation being passed, and in consequence of the great mortality of gastrostomy, and also because of the more frequent occurrence of malignant stricture in the upper portion of the tube, œsophagostomy is by far the preferable operation. 2. That even in cases where the stricture is as low down as the manubrium sterni (its depth being rarely very great), œsophagostomy is indicated as a preliminary or exploratory operation; and if it be found that the little finger or sound cannot be got through the narrowing, gastrostomy may be performed. 3. That if it result that the opening in the œsophagus has been made below

the stricture (as in most cases would be desired), the operation can be completed by stitching the mucous membrane to the wound edges, and the stricture may, if thought proper, be dilated through the opening at the time of operation or subsequently. 4. That if diseased œsophagus be reached, and no opening into it can be made through healthy walls, then it may be carefully perforated, either by the finger or the thermo-cautery. 5. Œsophagotomy has been many times done, and œsophagostomy several, and never have these operations caused any grave local or general symptoms, or, as operations, led to the death of the patient, whereas gastrostomy has proved most fatal. 6. The operation should be done on the left side of the neck, and a sound should, if possible, be passed, that of Vacca Berlinghieri being the best. The skin incision should be rather nearer the mid-line than that for ligature of the common carotid, and should extend from half an inch above the episternal notch to the level of the upper border of the thyroid cartilage. The surgeon should stand on the left of the patient, looking obliquely down and across his or her body. A tube with a funnel-shaped end should be passed and tied in place, and nourishment administered as soon as the tendency to vomit caused by the anæsthetic has passed off. It is necessary to make the opening in the œsophageal walls with a sharpish stab, to prevent the loose mucous membrane being pushed before the knife. The edges of the wound may be stitched up, and care taken that no food gets into it. 7. The operation should be undertaken before the patient's strength is much exhausted, and even before obstruction is complete, because, frequently, attempts to swallow produce spasmodic suffocative dyspnœa, as in first case related. 8. In severe cases of simple fibrous or syphilitic stricture in the nuchal or upper thoracic portion of the tube, œsophagostomy is indicated, as then the operation might be made curative as well as palliative. 9. Internal œsophagotomy must be limited to an extremely small percentage of cases, and some think it not justifiable, and excision of the diseased part of the œsophagus is

yet in its merest infancy, so that œsophagostomy is the best resource left us, and the operation, if performed with care, is not very difficult."

The question of what operation should be employed is so important that I will not hesitate to discuss in detail the points raised by Mr Reeves. From his own showing, œsophagostomy is only suitable for those cases in which the disease occupies the upper part of the canal, and he says that this portion of the gullet is most frequently attacked, but unfortunately he does not state very clearly what he means by the upper portion of the tube. I have come to the conclusion that the most common spot to find the primary tumour is immediately behind the cricoid cartilage, so that, if the patient presents himself to the surgeon sufficiently early, a successful œsophagostomy may be performed. But, as a rule, the aid of the surgeon is not asked until the disease has extended beyond the limits just mentioned. When the patient is seen at an early stage, and the healthy œsophagus can be exposed below the site of the disease, so that the healthy mucous membrane can be stitched to the skin, then I think œsophagostomy may be employed. But to make an incision in the neck, and through the tumour into the lumen of the canal, seems to me unjustifiable when gastrostomy may be performed. The operation is very limited in its application. In not one of the seven cases described above could it have been performed in the hope of having a satisfactory result. If, for example, in the cases of Mrs C—— (Case 4), and W. F—— (Case 3), I had opened the œsophagus in the neck, the probability is that within a few weeks I would have had to contend with a large fungating mass protruding through the fistula, whereas, by performing gastrostomy the wound is far removed from the site of the tumour.

Before concluding the discussion of this interesting subject it would be advisable to refer to statistics, and in doing so, I may say briefly:—observe that out of twenty-nine cases operated on by œsophagostomy ten lived over one month, while the great

majority of the remaining nineteen died within a week of the operation. The most successful case recorded is one operated upon by Hadlich[1] in 1880; the patient was sixty years of age, and was suffering from severe dyspnœa, the cause of which is not stated; the patient died thirteen months after the operation, and no necropsy was permitted. With such unfavourable results it is not surprising that œsophagostomy has fallen into disuse. From the large number of cases of malignant disease of the œsophagus which I have met with in hospital and private practice, I have not been able to select one in which I considered œsophagostomy justifiable.

In performing œsophagostomy the patient should be placed upon his back, with the head and shoulders slightly raised, and an anæsthetic having been administered, the face should be turned to the right. The surgeon, standing to the left of the patient, should then make an incision three or four inches in length, through the skin and subcutaneous tissue, along the inner border of the left sterno-mastoid muscle. The superficial fascia, the platysma myoides, and the deep fascia, should then be divided, the inner edge of the sterno-mastoid exposed, and the muscle drawn outwards and upwards by a broad retractor, so that the carotid sheath is exposed to view, and held to one side by an assistant. The connective tissue having been separated with the finger or a blunt instrument, and care being taken not to injure the superior or inferior thyroid arteries, or the recurrent laryngeal nerve, the left lobe of the thyroid gland and the trachea are exposed. These structures should be drawn forwards and to the right by a second assistant, when the lower part of the pharynx and œsophagus will be seen lying behind.

In œsophageal stenosis, a tube cannot be introduced through the mouth, so that the operator is not assisted, as in œsophagotomy, by its presence in the canal. When the gullet is found, an incision should be made in its wall. If the operation be undertaken for malignant disease, the lower down the opening

[1] Deutsche Zeitschr. f. Chir. 1882, Bd. xvii., p. 138.

is made the better, and, if possible, the margins of the mucous membrane should be carefully stitched to the edges of the cutaneous wound. In cases of cicatricial stenosis the incision should be made immediately below the stricture. A soft flexible tube should be introduced, and kept in position with sticking plaster, while a drainage-tube may be passed through the lowermost limits of the wound, and the edges united by sutures. The after-treatment must be carried out with great caution, special care being required in the introduction of the feeding-tube. A good plan is to have a soft curved elastic tube, from 4 in. to 5 in long, and of the size of a No. 9 bougie, with a shield the same as a tracheotomy tube, fixed in permanently, through which when the patient is being fed, a soft inner tube of smaller size is passed into the œsophagus. This avoids the danger of lacerating the wall of the œsophagus, or adjacent tissues.

The question may be asked, Is it not possible, in cases where the carcinomatous growth is situated high up, as in those of W. F—— (Case 3), and Mrs C—— (Case 4), to excise the growth and remove the whole of the disease? When the disease is limited to that part of the œsophagus immediately behind the larynx, and there is no involvement of lymphatic glands, then one might consider the propriety of performing a radical operation with the object of attempting a cure. In neither of the cases just mentioned could such a procedure be thought of, for, as is usually the course of events in such circumstances, both patients allowed the disease to advance too far before they were seen. This is, however, not always the case, and the enterprising surgeon has not been always satisfied by simply supplying the patient with food through a wound in the neck or stomach, but he has on several occasions attempted a radical cure by excising portions of the œsophagus. One of the most successful œsophagectomies was performed by Czerny in 1877, when he excised a small portion of the canal along with a carcinomatous growth, with a good result. The lower segment of the gullet was united to the wound, and after four months the patient fed herself so

conveniently through the fistula in the neck that she refused to have a subsequent operation performed for uniting the divided ends of the œsophagus. Novaro, Billroth, Israel, and von Bergmann also performed this operation, and their patients lived for seven weeks, four weeks, seven days, and one day respectively. Dr Ashhurst, in his statistics, mentions twelve instances in which œsophagectomy was performed, and he states that eight proved fatal, giving thus a mortality of 66 per cent. Œsophagectomy has therefore been practically abandoned, unless in very exceptional cases.

The first occasions in which gastrotomy was performed were by Crolins in 1602, and by Guenther in 1613, for the removal of foreign bodies. Shovel operated in 1635 by making a vertical incision through the left hypochondrium an inch and a half below the ribs, and removed a knife which had been in the stomach for six weeks; and about the same time Schwaben had an equally successful case. Successful cases are also recorded by Hubner in 1720, by Cayroches in 1829, by Bell in 1860, by Labbé in 1874, and from the statistics collected by Gross, Credé, and Richardson and Bernays, gastrotomy is shown not to be a dangerous operation, giving a mortality of not more than 10 per cent. Gastrostomy on the other hand was not practised so early. Opening the stomach in cases of stricture of the gullet was first suggested by Egebert in 1837, and recommended by Blondlot and Watson, but it was not until the year 1846 that Sédillot operated unsuccessfully for cancer of the œsophagus, and from that time until 1876, when Verneuil obtained the first success, the recorded cases constitute an unbroken series of failures. Since 1876, for cicatricial stricture alone, I find 48 cases of gastrostomy recorded, giving 25 recoveries and 23 deaths within a month of the operation; and for malignant disease, 280 operations have been performed, with 126 recoveries and 154 deaths within a month of the operation. Taking all the cases together, the chief causes of death were—of those who expired within a month—exhaustion, 53°/₀; peritonitis, 21°/₀;

pneumonia, 15%; bronchitis, 5%; other causes, 6%. As regards the period of death in these cases, as far as I can ascertain:—

Under 24 hours,	19%
Over 24 hours and under 48 hours,	15%
„ 48 „ „ 3 days,	9%
„ 3 days „ 1 week,	15%
„ 1 week „ 2 weeks,	17%
„ 2 weeks „ 3 „	14%
„ 3 „ „ 4 „	11%
	100

Within the last few years gastrostomy has been more successful, probably because greater care has been bestowed upon details, and the operation has been resorted to at an earlier stage in the disease. For example, Knie[1] has operated upon 13 cases with only 3 deaths, and Credé[2] upon 26 cases with 4 deaths.

It is not necessary to discuss statistics in detail, or to give references, but I would like to mention the facts which have been impressed upon me in studying the subject. In the large majority of unsuccessful cases the operation was performed too late, and hence we find that a considerable number of the patients succumbed to shock within forty-eight hours, while a large percentage also died from exhaustion, inanition, or extension of the disease a few days after the operation. Within recent years comparatively few deaths have been caused by peritonitis, pneumonia, or septicæmia. The statistics which I have now produced give a very different result from those collected by Verneuil, and published in 1879. He then showed that out of 30 cases in which gastrostomy had been performed for malignant disease, only one survived a month. On the other hand, I find that since 1884, out of 113 cases recorded, 80 have lived over thirty days. The two most successful

[1] Klin. Beobacht aus dem Chir. Hosp., von Dr A. Knie, in Moskau, I. 1886.

[2] Archiv für klin. Chir., Bd. xxxiii., Heft iii., 1886.

cases recorded are those operated upon by James Murphy,[1] and by William Whitehead. The first of these patients lived for 403 days, while the other was alive at the end of the thirteenth month.[2]

In performing gastrostomy the method I have employed has been as follows—I shall take as an example Case 3:—While the patient was under the influence of chloroform, an incision was made through the abdominal parietes an inch below and parallel to the left costal cartilages. The incision was an inch and a half long, and extended outwards and downwards from the margin of the left rectus muscle; with some difficulty, on account of the complete collapse of the organ, the stomach was felt. About a couple of square inches of the stomach wall were dragged through the incision in the parietes. A circle of sutures, each including about a quarter of an inch of stomach wall, was passed through the serous and muscular coats. The radius of this circle was about one-third of an inch. Each suture overlapped its neighbours by about one-eighth of an inch, so that when they were all introduced they resembled in form the tyre of a wheel. After all the sutures had been inserted in the stomach wall, the free ends were passed through subcutaneous tissue and skin and tied externally, so that when the operation was completed an area of stomach wall about the size of a shilling was exposed to view. Through the centre of this area two silver sutures were passed parallel to one another, and about a quarter of an inch apart. This method of stitching, by which the peritoneum and muscular tissue were left free and in full contact with the wall of the stomach, gave a broad base for adhesions and ensured the formation of a complete sphincter. After the operation the patient complained of thirst, but otherwise he was perfectly comfortable. Two-thirds of a grain of morphia were injected subcutaneously between the time of the operation and midnight. The patient was fed upon nutrient digested enemata and

[1] *British Medical Journal*, vol. ii. 1889, p. 930.

[2] Ashhurst's "Surgery," vol. vi., p. 40.

peptonised meat suppositories. Five days later a small galvanic cautery was introduced into the stomach between the two silver loops, which were held apart, so as to make a little tension upon the intervening area of stomach. Then a small gum-elastic catheter (No. 3) was passed into the stomach through the opening thus made, and fixed in position by means of adhesive plaster. He was now fed with milk, four ounces being given every two hours, in addition to the nutriment administered by the rectum. Every day larger tubes were inserted, so that a week later a piece of elastic tubing the size of a No. 17 œsophageal bougie was introduced, and beef-tea, milk, masticated porridge, and corn-flour were poured into the stomach through a filler by the patient himself. After the food was so taken the tube was withdrawn, the patient remained in the recumbent posture, and held a small pad of gauze over the opening. Within from fifteen to twenty minutes the wound contracted, so as to prevent the escape of the contents of the stomach. Only a ring of mucous membrane, one-twelfth of an inch broad, remained between the opening in the stomach and the cutaneous surface. Within a few days this also disappeared.

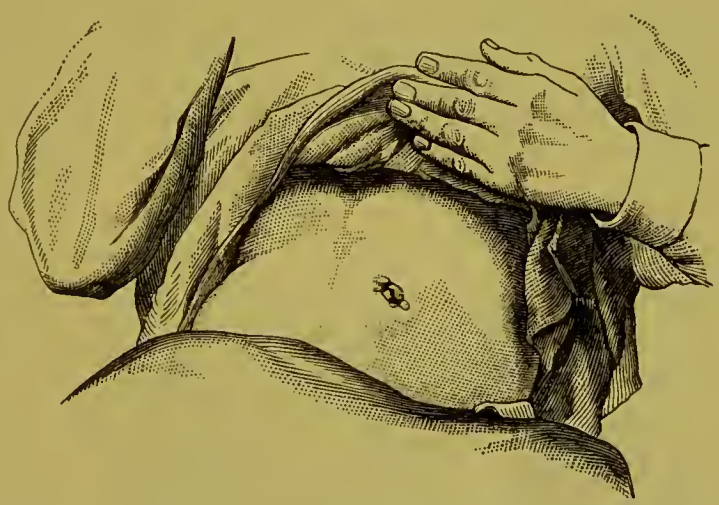
In respect to the operation of gastrostomy, it is very important to operate in two stages, the first consisting of exposing and stitching the stomach to the parietes, the second of opening the stomach after firm adhesions have formed, so as to obviate the danger of the contents of that viscus escaping into the peritoneal cavity. With reference to the first stage of the operation, a method a little different from that usually employed was adopted. The sutures did not include the peritoneum or muscular tissue, but, from the stomach wall they passed through subcutaneous tissue and skin only, and were tied externally. By this arrangement a considerable surface of the stomach was left in contact with the sides of the wound in the parietes; the two serous surfaces were not brought together; and so a broad and firm base for adhesion was secured. At the same time the formation of a complete sphincter was

assured, as demonstrated by the cases described. Regarding the second stage of the operation there is nothing worthy of note. When the patients wear elastic tubes no fluid escapes, but if the tube be removed for a quarter of an hour, in any of the cases, the fistula contracts, and prevents the passage of the smallest quantity of the contents of the stomach, and so enables the patients to walk about in comfort. The sphincter action is therefore as good as could be desired.

In selecting cases for operation we are very often hampered by the patient refusing to have anything done until he is so reduced in strength that so serious an operation must be attended with danger. Under favourable circumstances, and with due caution on the part of the operator, gastrostomy, when performed in two stages, should not be attended with much danger; but when the patient has allowed himself to reach the last stage of starvation before he seeks the aid of the surgeon, how can a favourable result be expected? The needles used were ordinary sewing-machine needles, round, and with an eye in the point. These were fixed on handles, and by heating in a spirit lamp were bent at an obtuse angle and tempered by dipping in oil. The sutures were silk cord, boiled in carbolised wax. The advantage of using a round needle is that it passes easily through the serous and muscular coats, and, when it reaches the more dense submucous layer, the difference in resistance is easily detected, and the danger of passing the suture into the cavity of the stomach is averted. It has been advocated by some surgeons that a double row of stitches should be inserted, but the disadvantage of unduly increasing the number of sutures employed is that the operation is much prolonged, and thereby the danger of death from shock is increased. One row of sutures is quite sufficient to keep the parts in apposition until adhesions form.

When the stomach has been empty for a considerable time, it is found to be situated to the left of the middle line, the pylorus occupying a position close to the left margin of the

rectus muscle, while the bulk of the organ is drawn up under the arch of the diaphragm. Consequently, in cases of stricture of the œsophagus, where the patient has been starved, the stomach is not to be looked for in its normal position. Labbé recommends an incision two inches in length extending from the left linea semilunaris outwards, parallel to, and half an inch below, the costal cartilages. Durham advises a vertical incision to be made, three or four inches in length, over the upper part of the linea semilunaris, while Sédillot makes a crucial incision through the upper part of the left rectus. Again, Hahn of Berlin recommends the following operation which he has performed in eight cases. An incision is made parallel with the lower edge of the last lower rib and the abdominal cavity opened. A



Case of cancer of the œsophagus at the level of the lower edge of the cricoid cartilage (Case 3). The illustration shows the gastrostomy wound with the feeding-tube withdrawn, and the complete sphincter action of the muscles of the parietes, which allowed no food to escape externally. If the patient lay on his back for a few minutes after taking food he could afterwards walk about with freedom. The gastrostomy was performed on November 6th 1890, and the patient enjoyed good health till the end of the following July. During the autumn he lost flesh and became very weak; no involvement of lymphatic glands; tumour in œsophagus remained stationary. He was readmitted to the Royal Infirmary on November 5th 1891, and died on the following day from syncope and congestion of the lungs. Post-mortem examination: No great laryngeal obstruction, no glandular involvement or secondary formations. Microscopic section proved the tumour to be a scirrhous cancer.



Case of epithelioma of the œsophagus behind the cricoid cartilage (Case 4). Gastrostomy was performed on January 29th 1891, and tracheotomy on March 28th, for œdematous laryngitis. The illustration shows feeding and tracheotomy tubes in position. The patient improved during the spring and summer months, but when seen in October the cervical glands were involved and the larynx obstructed. She has not been seen since October.



Epithelioma of the lower end of the œsophagus (Case 8). The illustration shows the feeding tube withdrawn. Sphincter action was very complete, so that the tube could not be left out for more than a few minutes. The patient progressed favourably during the early summer, and the disease advanced very slowly; but not receiving proper attention at home, he was found dead in bed from starvation.

second incision is made in the eighth intercostal space, close to the junction of the eighth and ninth costal cartilages, through skin and muscular tissue, in a direction obliquely from above downward and outward. The parietal peritoneum at this point is punctured by a pair of curved dressing forceps, or incised; this is enlarged by spreading the forceps. The thumb and index finger of the left hand are introduced into the abdominal wound, and the stomach sought for at a point corresponding as nearly as possible to the fundus. This is grasped by the dressing forceps and drawn through the eighth intercostal space, until the stomach wall overlies the surrounding integument for the space of one centimetre. After covering the wound first made with antiseptic gauze, the stomach, in case the opening is to be made at a subsequent sitting, is sutured by means of its serous covering only to the edges of the wound. In case it is to be opened at once, the serous, muscular, and mucous coats are together attached to the opening in the intercostal space. The abdominal wound is then sutured. After numerous trials upon the cadaver, Hahn found that there was no danger of wounding the diaphragm if care was taken to always select the space between the cartilages of the eighth and ninth ribs, inasmuch as the former has its attachment to the cartilages of the seventh rib towards the median line, in such a manner as to leave the eighth intercostal space uncovered and free for operation.

The advantages claimed for the operation are as follows:— 1. A small and contracted stomach can with greater ease be drawn forward and attached at this point. 2. The attachment seems to be more reliable than when made to the edges of the abdominal wound. The contents of the stomach, on account of the better closure of the opening, do not come into contact with the wound to the same extent as in the older methods. 3. The feeding of the patient can be better accomplished; the closure of the space by the approximation of the ribs acts as a pinch-cock, thus preventing fluids from finding their way out alongside of the

feeding-tube. 4. No obturator or other means of closing the opening later on is necessary. A gradual dilatation of the fistula, owing to the resistance offered by the cartilages of the ribs, cannot occur.

By the results of the statistics of recent operations the surgeon is certainly encouraged to resort to gastrostomy as soon as the patient is unable to take sufficient food by the mouth, in those cases where it is inadvisable or impossible to feed him by tubes.

It is very difficult for a surgeon to form an opinion from statistics, so many matters of detail require to be considered in each individual case. But still, statistics give some idea of the general risk which the patient runs, and when we take this, together with the probable duration of life without operation, a tolerably accurate judgment may be arrived at. Say, for example, in an average case where deglutition is very imperfect, if no operation be performed death from starvation is certain within a few weeks. By delaying the operation the immediate dangers are proportionately increased, while, by opening the stomach when the patient's strength is good, the risk of the operation proving fatal is about one to thirteen, and the probability of life being materially prolonged is considerable. In carcinomatous disease, all the operation can do is to prolong life and alleviate suffering, and whether the operation is justifiable or not, must be left to the judgment of the surgeon and the desires of the patient, after the whole circumstances have been explained to him. But in this connection I must confess that not infrequently those cases suitable for operation elect not to be operated on, while those who are less suitable, on account of exhaustion, solicit the surgeon to act at once. It is often very difficult to hold the balance justly.

CHAPTER VI.

MALIGNANT DISEASE OF THE LARYNX.

General question of Diagnosis of Tumours—Etiology of Tumours—The Symptoms of Malignant Disease of the Larynx—Sarcoma and Carcinoma—Characteristics of the Sarcomata; two illustrative cases.

In pre-laryngoscopic times, the diagnosis of a tumour in the larynx was limited to those cases in which the growth occupied the upper part of the laryngeal cavity, so as to be either visible to the eye when the tongue was depressed, or within reach of the finger. Isolated cases of laryngeal polypus were recorded even as far back as the middle of the eighteenth century; but, at that time, and for many years subsequently, the diagnosis of such tumours was most uncertain. It was only towards the middle of the present century that the diagnosis of these diseases became exact, and that attempts were made to extirpate laryngeal growths by the mouth; although one hundred years previously, it is true, Kaderik performed for the first time, successfully, the endolaryngeal operation. I will not attempt even briefly to trace the gradual development which has taken place during the last half-century in the diagnosis and treatment of the diseases we are now considering; but I think I may say with confidence that, whereas new formations in the larynx were formerly supposed to be of rare occurrence, and beyond the reach of the surgeon, they are now not only readily recognised during the life of the patient, but they may be successfully removed by surgical appliances. In fact there is probably no

other class of diseases in which the advantages of laryngoscopic examination have been more clearly demonstrated. Not only are tumours now known to occur more frequently than was formerly supposed, but there is even a tendency on the part of practitioners to believe that they prevail more commonly than is, on reference to statistics, actually found to be the case. It is found in practice that tumours of all kinds constitute only a small proportion of the chronic maladies of the larynx, certainly not more than two or two and a half per cent., so that, although the diagnosis of the individual case may be of the utmost importance to the patient, the number of cases which are met with in general practice is comparatively small.

The *etiology* of malignant tumours of the larynx is a question which is exceedingly involved, and one upon which little real light has up to the present been thrown. What is the effective cause of the production of a tumour? It is not possible at present to give a definite answer to such a question. In many cases the cause is not apparent, and in others, the connection between the new formation and its alleged cause is remote.

Chronic catarrh of the laryngeal mucous membrane is one of the most fruitful causes of malignant growths in the larynx; but probably both hyperæmia and chronic catarrh are blamed more frequently than they deserve. May they not be, in many cases, the result rather than the cause of tumour? The etiological conditions of inflammatory processes, and what has been called the tumour-dyscrasia, are closely related to one another, especially in some forms of chronic inflammation and sarcomatous growth. In fact, it is very difficult to draw a line between the etiology of some forms of chronic inflammation and the production of tumours. I am quite willing to admit that mechanical irritation of the laryngeal mucous membrane, either as a consequence of over-use of the voice, or from other sources, may act as a predisposing cause to tumours, either malignant or benign.

Those individuals who, from their profession, require to over-exert their vocal organs, such as clergymen, public speakers, singers, teachers, etc., are very prone to the diseases I am now discussing. As in other parts of the body, so also in the larynx, long continued irritation may lead to the development of a tumour. Such a cause of tumours has long been accepted; but it is also known that growths may form without any irritation, and on the other hand that continued irritation and chronic inflammation may be present, and are present in multitudes of individuals, without leading to any tumour formation. The influence of sex is of importance. Men, from the fact that they are more exposed to vicissitudes of weather, irritating gases, and from the circumstance that, as a rule, greater demands are made upon their vocal organs, are more apt to be affected than women. The influence of age is of some importance also. Between forty and sixty is the period at which malignant growths are most apt to form.

The influence of heredity is difficult to prove, but what is attributed to inheritance in the production of tumours in other parts of the body should, I think, be admitted in cases of tumours in the larynx. Syphilis and tuberculosis, only in so far as they lead to chronic hyperæmia and catarrh, may be regarded as predisposing causes of tumours. These diseases, however, particularly the latter, generally lead to the death of the patient long before the catarrh has become sufficiently chronic to produce true tumours. Inflammatory new formations frequently develop, associated with tuberculosis, but these do not concern us at present.

The *symptoms* indicative of the presence of a tumour depend upon four circumstances—the nature, the situation, the extent of the new formation, and the intensity of the inflammation excited by its presence. The most important symptoms are interference with phonation, cough, pain, hæmorrhage, and obstruction to respiration, or to deglutition.

I will now take up these symptoms separately, but, in doing so, I desire to impress the fact that the interference with function is only a vague indication of the nature of the disease; it is upon a laryngoscopic inspection that the diagnosis must rest.

Phonation is more or less interfered with in all cases, and in some aphonia may be the only symptom present. The voice may be altered in various ways, according to circumstances; in some cases it may only be changed in tone and in quality, in others it may present the characters described as "Punchinello," it may be reduced to a hoarse whisper, or it may be entirely lost. Interference with normal phonation, as a symptom, depends more upon the seat of the tumour than upon its size. A very small growth in one situation may cause more marked interference with the voice than a tumour of much greater size occupying another part of the laryngeal cavity.

Cough is not a constant symptom, but as a rule the patient has an uncontrollable desire to clear his throat. Should an attack of catarrh occur, cough may become very distressing, and be accompanied by spasm of the larynx. Sometimes portions of the growth may be expectorated.

In non-malignant growths, pain and dysphagia are seldom pronounced features; whereas, even in the early, but especially in the latter stages of malignant disease, both these symptoms are generally present. In cancer of the larynx, the pain is, as a rule, limited to the larynx during the early stage; but when the growth has increased in bulk, the pain radiates to the ear, forehead, and orbit of the affected side, probably on account of irritation of the sensory fibres of the superior laryngeal nerve, which irritation may be reflected along the auricular branch of the vagus. It is not uncommon, however, in cases of benign tumours, for the patient to complain of discomfort and disagreeable sensations, although not amounting to actual pain. The feeling of the presence of a foreign body, and the constant desire

to get rid of it, may be the only discomfort of which the patient complains.

Hæmorrhage arising from the presence of a tumour is almost pathognomonic of cancer, especially when large in amount. It may be due to erosion of the walls of small blood-vessels from necrosis of the tumour-tissue, in which instance the hæmorrhage is usually copious. Usually, however, the quantity of blood lost is small, and only appears in the expectoration as streaks on the surface of the muco-purulent secretion. The absence of pain and hæmorrhage is often very misleading, as will be shown in cases quoted in the following chapters. In a very considerable number of the cases which have come under my notice, the fact that the patient did not suffer much from the disease induced him to delay coming to hospital, and permitted the disease to extend beyond relief or cure.

Hæmoptysis from the bronchial tubes or lung may occur in the course of any case of tumour in the larynx from violent coughing, but the quantity of blood lost is seldom great, unless in malignant disease.

In a considerable percentage of cases, difficulty of respiration is present, but dyspnœa of a serious nature is less common than disturbance of phonation. In some cases, however, the difficulty in breathing suddenly becomes so urgent that tracheotomy is required. This dyspnœa may be due to three causes: to mechanical obstruction from the presence of the growth, to spasm of the laryngeal muscles as a consequence of local irritation, or to an infiltration of the areolar tissue of the larynx with serous effusion. A growth may occupy the larynx for a considerable time without leading to any serious impediment to respiration, when suddenly, without any apparent cause, the patient is seized with a dangerous complication, spasm of the glottis. In such cases, the stridor and dyspnœa are often considerable, but the spasm seldom leads to a fatal issue. When the growth is situated high in the larynx, and especially when the epiglottis is involved, deglutition is apt to be interfered

with. When pedunculated tumours exist, the dyspnœa may be transitory and paroxysmal; and even when there is a large tumour in the larynx, such as there was in two of the cases (Nos. 2 and 4), the obstruction to respiration may be very marked at one time, while at another breathing may be comparatively free.

I shall endeavour, with the aid of the patients and specimens, to describe the two malignant tumours which may attack the larynx. These are the sarcomata and the carcinomata; and they may be classified as intrinsic or extrinsic, according as they are limited to the cavity or not. Growths occupying the interior of the larynx and attached to the false vocal cords, the true cords, or the parts immediately below them, should be included under intrinsic tumours; whereas those growing from the aryteno-epiglottic folds, from the epiglottis, or from the interarytenoid fold are more properly described as extrinsic. This division, as I will point out to you shortly, is, when operative interference is contemplated, of great clinical importance.

Let me now say a few words regarding the SARCOMATA. These tumours are constructed on the type of embryonic connective tissue, which may or may not undergo development towards an adult form. It may be broadly stated that the more closely the tumour resembles in structure embryonic connective tissue, the more malignant it is likely to be; in other words, the malignancy of the growth is in an inverse ratio to the development of its tissue Thus the round-celled sarcoma is more malignant than the spindle-celled, and the spindle-celled more so than the fibrous or fasciculated.

Sarcomata in the larynx generally originate in the submucous connective tissue, rapidly attain a considerable size, and usually invade all the structures with which they come into contact; as a rule they are sessile, smooth, or slightly lobulated, and commonly they are covered with normal mucous membrane, but, in some instances, the capillaries on the surface become

distended, and impart to the membrane a dark hue. The surface may present a papillomatous appearance, but deep ulceration is seldom met with in these growths. The mode of development of the primary growth is easily followed, and the rapidity of its increase depends upon the nature of its histological elements. When it is soft and rich in cellular elements, the growth is rapid and the tumour vascular; whereas, when its texture is more fibrous, its consistency greater, and the cells spindle-shaped, the increase in bulk is comparatively much slower.

Besides rapid growth, one of the most pronounced characteristics of the sarcomata is the tendency which they have to continuously invade the surrounding tissues. Masses of round or spindle-shaped embryonic connective-tissue cells form in, and become incorporated with, the neighbouring parts, so that, in their mode of growth, they closely resemble inflammatory new formations. The tumour moulds itself to the normal tissues, but at the same time the cells which form it replace, to some extent, the histological elements of the existing structures. In the sarcomata, there is no proper stroma of connective tissue, so that the blood-vessels are in immediate contact with the cells. The lymphatic vessels are not abundant, and consequently the lymphatic glands have little tendency to become enlarged, and secondary metastatic formations are rarely met with associated with these laryngeal growths.

Case XVII. (1)—*Large alveolar sarcoma of larynx, containing myeloid cells and osseous trabeculæ; death from exhaustion on evening of admission.*—When the patient was seen for the first time, he stated that the first symptom that attracted his attention, was pain in the region of the larynx. This symptom, he said, had been present for about twelve weeks. Within the last few days, however, the pain had commenced to radiate to the ears and lower part of the face. During the first few weeks, there had been no great interference with speech or respiration. About six weeks previously he complained of difficulty in degluti-

tion and slight dyspnœa, and since that time the symptoms had gradually become more marked, so that, on admission, there was almost complete aphonia, unless when the patient made a special effort; only then did he succeed in producing a vocal sound. There was no great interference with the passage of air through the larynx during inspiration, and expiration was comparatively free. On palpation of the neck, I found the larynx to be distorted, the alæ of the thyroid cartilage, particularly the left, being pressed forwards, and away from the middle line.

On laryngoscopic examination, the tumour appeared as an ill-defined swelling, occupying chiefly the left side of the larynx, but also involving the right vocal cord, and the base of the epiglottis. The opening of the glottis was seen to be considerably diminished in size, and pressed to the right side. The aryteno-epiglottidean folds were indurated and œdematous, and the base of the epiglottis was so swollen that it was with difficulty that the interior of the larynx could be seen. The mucous membrane of the larynx was smooth, and in no part was there any evidence of recent or old inflammatory changes.

Whne seen at the dispensary, the patient was so weak and reduced in health that I directed him to be admitted into the hospital immediately, not only on account of the disease of the larynx, but also in order that his general condition might be attended to. The patient was admitted at once, and, when placed in bed, the house physician found him to be so exhausted that he considered it advisable not to submit him to a careful examination at that time, as it was evident, from a physical examination of the chest, that he was suffering from hypostatic congestion of the lungs. The patient gradually became weaker, and died on the evening of admission.

A *post-mortem* examination showed that he had been suffering from chronic tubular nephritis; dilatation of the right ventricle, and hypertrophy and dilatation of the left ventricle, without

valvular disease; hypostatic congestion of the lungs, and nutmeg liver.

On examination of the larynx, the tumour was found to be about the size of a walnut, and was situated between the alæ of the thyroid cartilage and the mucous membrane of the larynx, all the intervening tissues having been infiltrated by the neoplasm. It did not extend above the thyroid cartilage, nor below the cricoid cartilage, on its posterior aspect. In front, however, it passed up as high as the lower third of the epiglottis; and the anterior part of the thyroid cartilage was infiltrated and perforated by the tumour, a small portion of which was found occupying the space in front of the crico-thyroid membrane. The great bulk of the tumour occupied the left side of the larynx, but some of the tissues in front and to the right were also found to be invaded. The right vocal cord particularly was involved, and the lower third of the epiglottis measured fully a quarter of an inch in thickness. No secondary formations were discovered. On section, the substance of the tumour was found to be of an uniform moderately firm consistency, and whitish-yellow colour, and on microscopic examination was found to present the characteristic appearances of an alveolar sarcoma. The tumour possessed a distinctly alveolar arrangement, some of the alveoli being occupied by three or four embryonic cells, while others contained a great number of large cells closely resembling epithelium in appearance. At some parts, the tumour was composed of simple round and spindle-shaped cells, without any distinct tendency to an alveolar arrangement, while at other parts the masscs of cells were intersected by delicate strands of connective tissue, which divided the cells contained in the larger alveoli into small clusters. At one part of the section examined, several myeloid cells containing numerous nuclei were seen, and, almost at the same point, a distinct osseous trabecula was found. The trabecula was not situated, as far as could be discovered, close to or in contact with cartilage, but appeared to be in the substance of the tumour. This is the only part where the

elements of the tumour showed a tendency to form osseous tissue.

This form of sarcoma is closely related to the carcinomata, and it is frequently extremely difficult to declare whether such tumours should be placed amongst the sarcomata or the carcinomata. The principal points which distinguish this form of sarcoma from carcinomata are these:—(1) the stroma and the cells are intimately interwoven; (2) the blood-vessels run amongst the cells, and in the stroma; (3) metastasis is usually by the blood-vessels; and (4), as a rule, the lymphatics are not involved. On the other hand, in cancer, the stroma and cellular elements, which are epithelial in their origin, are easily separated from one another, the blood-vessels run in the stroma only, and metastasis is primarily by the lymphatics. Both growths are, however, equally malignant, but cachexia is seldom observed so early in the sarcomata as in the cancers.

A specimen in the Royal Infirmary Museum is of historical interest, and was placed in the museum by my predecessor, the late Dr Foulis. It is also one of sarcoma, but not precisely the same as the last preparation. It is the first larynx excised in this country for malignant disease. On examining the parts the tumour was found to be situated on the under surface of the left vocal cord, and formed a pendulous mass, which hung into the trachea as far as the first ring. From the upper part of the tumour, an extension had taken place upward, and it presented a soft pale appearance. Its structure was that of a spindle-celled sarcoma. The larynx was excised by Dr Foulis on September 10th 1877, and a detailed account of the case is given in the *Lancet* for October 13th 1877, and January 26th 1878.

The sarcomata may originate in any part of the larynx, and may attack persons of any age. Dr Wassermann[1] has collected thirteen cases of sarcomata of the larynx, and he has arranged them in the following table according to age:—

[1] Über die Exstirpation des Larynx, Leipzig, 1889, p. 25.

Between	10	and	19	years,	2	cases,—	1 male,	1 female.
„	20	„	29	„	2	„	2 „	—
„	30	„	39	„	—	„	— „	—
„	40	„	49	„	3	„	3 „	—
„	50	„	59	„	5	„	5 „	—
„	60	„	69	„	—	„	— „	—
„	70	„	79	„	1	„	1 „	—
					13		12 men.	1 woman.

Of these cases, four were stated to be spindle-celled sarcomata, three cases were round-celled sarcomata, one case was an adeno-sarcoma, and two were put down as lympho-sarcomata.

CHAPTER VII.

MALIGNANT DISEASE OF THE LARYNX—*Continued.*

Cancer of the Larynx—Typical case of Extrinsic Disease—Cases illustrating Cancer of the Larynx in various stages and situations: 1. Extrinsic; 2. Intrinsic.

CANCER of the larynx appears, in the great majority of cases, as epithelioma. Medullary cancer comes next in order of frequency, and the least common variety is scirrhus or hard cancer. I have no intention at present of entering into a detailed discussion of the various forms of cancer which may affect the larynx. By doing so, I would occupy more space than I have at my disposal; and, besides, I think it better to refer to specimens and cases.

When cancerous disease attacks the larynx, it is usually limited to the cavity, and, during the early stages, seldom extends to the lymphatic glands. It is true that at one time it was believed to arise not in the larynx itself, but in the parts close to it. This, however, was a misconception; and it is now a recognised fact that cancer is more frequently intrinsic than extrinsic in its origin. In many cases, it is impossible to decide precisely where the disease commenced, but this is not a matter of great clinical importance; the point which one is anxious to make out is not whether the disease has its origin in one or other part of the larynx, but whether it is limited to the cavity itself, or has extended to, or originally involved, the epiglottis, the base of the tongue, the aryteno-epiglottidean folds, or the œsophagus.

In the cases met with in hospital practice, the disease is, in many instances, so far advanced before admission, that it is not easy to ascertain the part of the larynx first affected; but by referring to the literature of the subject, I find that, of the parts external to the larynx, the epiglottis is most frequently attacked, while of the intrinsic parts the vocal cords are the most common seat of the primary nodule.

Cancer of the larynx is practically a disease of advanced life, 50 per cent. of the cases occuring between the ages of 50 and 70; sarcoma, on the other hand, is a disease of middle life, appearing usually between the thirtieth and fiftieth years.

CASE XVIII. (2).—*Extrinsic carcinoma of larynx with involvement of lymphatic glands. Marked relief of symptoms by tracheotomy*—The case which I am about to describe illustrates in a most typical manner the symptoms and appearances of an extrinsic epithelioma of the larynx. The patient, D. M'K., aged 64, sent to me by Dr Dickie of Strone, was admitted to the Royal Infirmary. At that time he was only able to speak indistinctly, and so was unable to give a very accurate account of his illness. From what he stated, it appeared that eighteen months before admission, he noticed for the first time an alteration in his voice, unaccompanied by pain during either phonation or deglutition. The alteration in the voice gradually became more marked, and was accompanied by pain in front of the larynx. At that time, there was no difficulty in swallowing or breathing. It was not until a fortnight before admission that he suffered from dyspnœa. This symptom appeared very suddenly, and was associated with a severe paroxysmal cough which caused him considerable distress; so much so, that on one occasion his wife feared that he would die from suffocation. On admission to the ward, the obstruction to respiration was so great that I considered it advisable to perform tracheotomy without delay.

As the patient was advanced in years, and the dangers of the administration of a general anæsthetic, such as ethidene dichloride, chloroform, or ether, were considerable, I thought it

advisable to avoid their use, and resolved to try the effect of a hypodermic injection of a 5 per cent. solution of hydrochlorate of cocain. Therefore, about twenty minutes before operating, twenty minims of the solution were injected under the skin over the cricoid cartilage. This caused complete local anæsthesia, and tracheotomy was performed with as much deliberation as if the patient had been under the influence of chloroform. During the operation, he only suffered slight discomfort, no actual pain.

The day following the operation, I made a careful laryngoscopic examination, and found the tumour occupying the upper two-thirds of the cavity, and attached to the false cords on the right side. The growth was also seen to extend along the right aryteno-epiglottidean fold, to the base of the epiglottis; and it stretched across the cavity so far that respiration by the mouth seemed impossible. The upper surface of the tumour was ulcerated, and covered by a coating of gray mucus and slough, which, when removed, exposed an irregular surface with elevated edges.

A few days after the trachea was opened the laryngeal obstruction somewhat subsided, and the voice improved a little. This favourable change might be accounted for by the rest afforded to the affected parts.

After admission, the growth increased in size rapidly, and soon there was no possibility of respiration by the natural channel, and the aphonia was complete. When I first examined the patient, it was with difficulty I could detect any enlargement of the lymphatic glands; but very soon, not only could indurated glands be detected at the side of the thyroid cartilage, but there was also a chain of enlarged glands in the sublingual region. The patient died thirty-two months after the onset of the disease.

The cases now to be described illustrate cancer of the larynx in its various stages and situations. In such cases it is not of great clinical value to determine the precise site of the origin of the disease; the more important point one is anxious to settle is,—Is the tumour limited to the laryngeal cavity, or has the morbid process originally involved or extended to the epiglottis,

the base of the tongue, the aryteno-epiglottidean folds, or the œsophagus? And, further, have the lymphatic glands become invaded by the disease? To put it briefly,—Is the disease extrinsic or is it intrinsic? A case described (Case 2), illustrates the former class of diseases.

In intrinsic carcinomata, the most prominent symptoms usually are alteration in the voice, and obstruction to respiration. But not always so. When the tumour is situated above the vocal cords, even though it is intrinsic, the symptoms just mentioned may not be present. This is well shown in

CASE XIX. (3).—*Small intrinsic epithelioma of larynx; relief of symptoms for two months by tracheotomy; thyrotomy and complete removal of tumour; no recurrence fifteen months thereafter.*—C. M'W——, æt. 50, consulted me first on the 25th of October 1890, when he informed me that he had been suffering from slight hoarseness during the last ten months. The affection of the throat came on suddenly, and remained till the present time without intermission, but sometimes the voice was a little clearer than at others. The patient was occupied during the night in a printing office, and on rising in the afternoon he frequently experienced considerable difficulty in speaking—the aphonia being more marked after sleep than at other periods of the day or night. There was no dysphagia or dyspnœa, and the patient's health appeared otherwise good. Examination with the laryngoscope was made with great difficulty, partly on account of the great irritability of the pharynx, and partly as a consequence of the small size of the patient's mouth, and the position of the epiglottis. The epiglottis was unusually large, and lay back so as almost to touch the posterior wall of the pharynx. After spraying the parts with a solution of cocain, the epiglottis was dragged forward, and a view of the larynx obtained with difficulty. The mucous membrane of the larynx was found to be deeply congested, and, occupying the anterior third of the left vocal cord, and, about an eighth of an inch of the right, there was a small warty-looking growth which I took to be an epithe-

lioma. How far the tumour extended below the cords could not be made out. The lymphatic glands were not involved.

On the 9th of November I performed tracheotomy, as it was found impossible, on account of the very irritable condition of the larynx, to remove the growth or a portion of it by laryngeal forceps. Soon after the tracheotomy was performed, a considerable improvement was observed in the condition of the larynx: the hyperæmia subsided, and during the months of November and December the tumour perceptibly diminished in size, so much so, that I had some doubt as to the accuracy of my first diagnosis. There was no history of syphilis, but for diagnostic purposes I placed the patient upon iodide of potassium.

In the beginning of January I asked Dr Joseph Coats, who sent the case to me, to examine the larynx again, and on doing so he agreed with me regarding the improvement that had taken place during the last two months. The patient was also satisfied that he could speak more clearly and with greater ease. The tracheotomy tube was retained.

On the 7th of February I again saw the patient, and he informed me that since his last visit he had suffered from a severe cold, associated with much coughing, and a moderate amount of expectoration. At that time, the voice was decidedly worse than on any previous occasion, and, on making a laryngoscopic examination, the mucous membrane was found to be deeply injected, and the tumour was considerably increased in size. There was, however, no dyspnœa. Apart from the throat affection the patient enjoyed perfect health. I therefore resolved to remove the tumour by thyrotomy, and Dr Coats concurred in my view that it was the proper treatment. On the 13th of February the patient was placed under chloroform, the vapour being administered through the tracheotomy tube. When the patient was anæsthetised, an attempt was made to introduce a Trendelenburg's tampon-cannula, but it produced such violent spasm of the trachea and bronchial tubes that it was at once withdrawn. I then endeavoured to employ a Hahn's sponge

tracheal tube with the same result. The tracheotomy cannula was then replaced, and, to the inner tube of it, an elastic tube, six inches long, was attached, so as to permit the anæsthetic being administered at a little distance from the operator. An incision was then made in the middle line in front from the hyoid bone to the upper edge of the cricoid cartilage; after exposing the thyroid cartilage and the thyro-hyoid membrane, the cavity of the larynx was opened with a strong pair of scissors, and a small sponge, with a thread attached, was placed in the trachea above the tracheotomy tube. This effectually prevented any blood from passing downwards. The two sides of the larynx were held widely apart with blunt hooks, and a very good view of the growth was got by illuminating the larynx with a forehead electric light. The disease was more extensive than was suspected, so that I had not only to remove the left vocal cord and the anterior half of the right cord, but also a considerable portion of the mucous membrane below the cords. This was done by scissors, and the cut surface was freely cauterised with the electric cautery. The small sponge was then withdrawn, the larynx cleansed, powdered with iodoform, and plugged with gauze. On the following day, the gauze was removed, and a careful examination of the larynx made through the wound, but no remnant of the tumour was discovered. A microscopic examination of the growth by Dr Coats showed it to be a squamous-celled epithelioma. The patient was fed for the first four days by an œsophageal tube, and he was kept as much at rest as possible. No sutures were employed, but the two sides of the wound were brought together and kept in position by sticking plaster. The patient made a most satisfactory recovery, and can now speak clearly, the false cords having taken up the function of the true cords. The patient is free from discomfort, and has been following his occupation for the last twelve months (March 1892). Now, thirteen months after the operation, the larynx is quite healthy in appearance, with the exception of the absence of the true cords, which is com-

pensated for in a remarkable degree by the false cords; the voice is good.

I may mention another case of intrinsic carcinoma of the larynx, one in which I performed complete laryngectomy.

CASE XX. (4).—*Intrinsic carcinoma of larynx; complete excision of larynx; no local recurrence in throat, but involvement of lymphatic glands a year after operation, and death from exhaustion in twenty-first month.*—The patient first noticed a slight hoarseness in speaking, which was unaccompanied by pain or by any difficulty in swallowing or breathing. The hoarseness commenced about November 1882, and continued until the following summer, when some improvement took place, but he was not certain whether the voice regained its former condition or not. The following winter (1883–84) his throat again troubled him, became worse than during the preceding year, and since then the disease has gradually developed to the present condition. He also complained of pain over the larynx, extending upwards to the left ear, but not increased by palpation. Aphonia was complete, and there was slight difficulty in deglutition. Digital examination externally did not reveal any alteration in the size or form of the larynx, or enlargement of the lymphatic glands. The epiglottis was practically normal, but the arytenoepiglottidean folds were slightly thickened, and the mucous membrane of the upper part of the larynx was hyperæmic. On the left side, midway between the arytenoid cartilage and the thyroid attachment of the false cord, there was a deep ulcer with a sharply defined edge anteriorly, but posteriorly the edge was rounded, and the mucous membrane covering it presented a warty appearance. On the right side, the mucous membrane was considerably thickened over the false cord; the true vocal cords were completely destroyed by a large ulcer, which extended down as far as the lower margin of the thyroid cartilage, and presented the characteristic appearance of an advancing epithelioma.

Tracheotomy was performed on the 14th of January 1886, and a fortnight afterwards the entire larynx was removed.

When dismissed from the ward the patient wore an artificial phonatory apparatus. His articulation was wonderfully good, and, except for its monotony, was not distinguishable from his natural voice. The vowels were pronounced with perfect clearness, both when he spoke in a whisper with the reed out, or when he attempted phonation. The reed remained silent during ordinary expiration and inspiration, but when the patient made a slight effort the reed was thrown into vibration, and a pure note was produced which became modified in the buccal cavity into articulate speech. He was able to swallow both solid and fluid food without difficulty. On laryngoscopic examination all the parts were found to be perfectly normal and free from inflammatory changes, and the patient was able to follow his regular occupation (that of a confectioner) without inconvenience.

During the following summer he enjoyed good health, and gained fully two stones in weight. Until Christmas of 1886 repeated examinations failed to reveal anything abnormal. At that time I had an opportunity of making a careful examination, and detected a suspicious swelling about the size of a walnut, situated below the angle of the jaw on the left side. There was no evidence of disease in the throat, and the patient had no difficulty in swallowing or breathing, and his general health was unimpaired. The swelling in the neck continued to increase till midsummer of 1887, when I discovered that softening had taken place and that a cyst had formed. On evacuation, the cyst was found to contain seven ounces of dark brown fluid in which were suspended numerous fatty, irregularly shaped epithelial cells. After the cyst was opened, the patient experienced some relief, but by August, he complained of considerable difficulty in swallowing on account of increase in the swelling in the neck. Owing to the great difficulty he had in taking food and the continuous discharge from the cyst, the patient emaciated rapidly, and died from exhaustion on the 2nd November 1887, twenty-one months after laryngectomy was performed. As far

as I could ascertain there was no recurrence of the tumour in the throat nor evidence of involvement of internal organs.

In connection with these cases of intrinsic carcinoma, and in contrast to Case 2, I may now describe two cases of extrinsic disease. They are by no means typical cases—quite the contrary. They are quoted to show how far the symptoms of the disease may depart from those usually described.

Case XXI. (5).—*Extrinsic epithelioma of the larynx, with no characteristic symptoms.*—Mrs. M., aged thirty-eight, was admitted to the Throat Ward on the 20th September 1887, complaining of a "soreness in her throat which interfered with swallowing," and stated that during the last two months occasional attacks of hoarseness had occurred, but as a rule her voice was good and clear. Her general health had not been robust for the last two years, but during that period she had not suffered from any definite illness, and it was only within the last six months that her throat had troubled her.

In April of that year, the patient suffered from what she believed to be "an ordinary sore throat," which she thought would "go away in a short time." This attack of "sore throat" manifested itself by painful deglutition, and slight dyspnœa, especially when she lay upon her right side; there was no cough, and any alteration there might be in the voice was barely perceptible. In a few days the acute symptoms subsided, but since then she always has been conscious of the presence of "something in her throat," and has had more or less difficulty in swallowing. Until her admission to the hospital these were the only symptoms. On laryngoscopic inspection an epithelioma was observed involving the upper portion of the larynx from the right arytenoid cartilage, along the right aryteno-epiglottidean fold to the tip of the epiglottis. The mucous membrane extending from the base of the epiglottis to the right side of the tongue was considerably thickened, and the right tonsil was probably also involved in the disease. Several of the submaxillary and cervical

glands were enlarged, but not painful. Died 5th November 1887.

CASE XXII. (6).—*Large extrinsic carcinoma of the larynx, œsophagus, and lymphatic glands, with few marked symptoms during early stage of disease.* This case is remarkable in that, during the early stage of the disease, symptoms were almost entirely absent. R. D., aged forty-nine, was admitted to the ward on account of a difficulty he had in swallowing, which he attributed to a swelling which occupied the left side of the neck. The patient was unable to give any very definite history of his illness, but as far as could be gathered from his statements it appears that he had no pain or trouble in swallowing till about a month before admission, when the swelling in the neck appeared. At first the dysphagia was slight, but rapidly became so marked that by the time he came to the hospital he was unable to swallow solids, although still able to take semi-fluid and fluid food with comparative ease. Occasionally, during and after meals, he suffered from severe paroxysms of coughing, apparently as a consequence of the passage of food into the larynx or trachea. At other times, the cough was seldom distressing, and was, for the most part, voluntary: there was no dyspnœa, little expectoration or pain, and the voice was not much altered from the normal. The laryngoscope revealed the presence of a large ulcerating epithelioma on the upper and back part of the larynx. The growth was limited to the upper third of the posterior aspect of the larynx, and extended downwards on the anterior wall of the œsophagus. During phonation, the movements of the vocal cords were not interfered with, but during deep inspiration they were not abducted completely on account of the induration and thickening of the parts behind the larynx. Several of the cervical lymphatic glands were enlarged, and on the left side of the neck there was a hard oval swelling, the size of a hen's egg, firmly adherent to the deep structures, but not to the skin.

These four cases illustrate several important facts connected

with malignant laryngeal neoplasms. Perhaps the most obvious of these is that the subjective evidences of the existence of a tumour depend more upon its site than upon its size. In the case last referred to, the tumour must have existed for months without giving rise to any complaint on the part of the patient, and, as a matter of fact, it was only when the disease had extended to the cervical lymphatic glands that he suffered any inconvenience, and this only consisted in slight difficulty in swallowing solid food. It is to be observed that in this case the disease was limited to the upper and posterior part of the larynx. In Case 5, where the tumour extended along the aryteno-epiglottidean fold and involved the epiglottis, the patient was more liable to attacks of acute laryngeal and pharyngeal catarrh, during which deglutition was painful, and breathing slightly impeded. At other times, during the first five months of the disease, she suffered little inconvenience, the most significant fact being her consciousness of the presence of a foreign body in her throat.

In Case No. 3 the epithelioma occupied the left vocal cord, and there was also considerable inflammatory congestion, which accounted for the marked aphonia. But, because of the small size of the tumour there was no dysphagia or dyspnœa. In Case No. 4 the epithelioma was large in size, and the symptoms were more marked, viz., complete aphonia, difficulty in deglutition, pain in the larynx and in the left ear, and occasional slight dyspnœa.

CHAPTER VIII.

MALIGNANT DISEASE OF THE LARYNX—*Continued.*

Diagnosis of the presence of a Tumour, and of its nature—Advantages and dangers of removing portions of a Tumour for diagnostic purposes—Diagnosis of Malignant Tumours—Prognosis.

We now come to the discussion of the general question of *diagnosis* of neoplasms of the larynx, and the two points we have to determine are, first, Is there a tumour in the larynx? and second, If so, what is its nature? For diagnostic purposes, symptoms arising from functional disturbance are, when taken by themselves, not of much value; thus, we may have all the subjective symptoms of tumour present without the existence of any new formation; and, on the other hand, a neoplasm may occupy the larynx for years without being suspected. It is only by a laryngoscopic examination that it is possible to be certain whether or not the laryngeal symptoms are due to the presence of a tumour. There are five methods which we may adopt in the diagnosis of tumour. These are: first, the employment of the laryngeal mirror; second, passing the laryngeal sound or probe; third, palpating the larynx externally, or passing the finger through the mouth; fourth, auscultation and percussion; and, fifth, microscopic examination of a portion of the growth removed by the endolaryngeal method. By the first method, namely, the laryngeal mirror, we can make out the relationship of parts, the situation, the colour, and the general appearances of the new formation; but, by the reflected image alone, it is difficult to estimate the consistency, or establish the situation

and seat of origin of the growth. For this purpose, we must employ the laryngeal probe or sound; by it, the insertion of the tumour may be precisely ascertained. Auscultation and percussion have both been employed in the diagnosis of laryngeal tumours, but the results are unsatisfactory as compared with those derived from the methods I have just mentioned, and they are now seldom resorted to. Palpation externally may reveal facts of importance. By external manipulation the relationship of the alæ of the thyroid cartilage, or of the cricoid and thyroid cartilages, may be ascertained; and infiltration or inflammatory enlargement of the lymphatic glands, as well as perforation of the cartilages by the tumour tissue, may be discovered. If, in addition to palpation externally, the larynx be anæsthetised, and the finger be introduced into the fauces or upper part of the larynx, points of considerable importance may be elucidated; the consistency and extent of the tumour, and the firmness of its attachments to neighbouring parts may be ascertained, and the observations made by the laryngeal mirror and probe corroborated.

To assist in diagnosing the exact nature of a tumour, there is no method more certain than removing a small portion of the growth, and submitting it to microscopic examination. But unfortunately this method of investigation has its dangers as well as its advantages, as illustrated by the following cases, which show the danger of rapid dissemination of cancer following partial removal of the growth.

Case XXIII. (7).—*Intrinsic epithelioma of left false cord; removal of portion for diagnostic purposes; rapid increase in size of tumour, and involvement of lymphatic glands.*—Without entering into detail it may be stated briefly that, when first seen, the malignant growth was strictly limited to the cavity of the larynx. I advised the patient, D. K—— (private patient), who was sixty years of age, and came under my care in 1889, to have the tumour removed by partial laryngectomy; but, before resorting to the operation, I was naturally anxious to

confirm my opinion respecting the nature of the growth by an examination of microscopic sections, telling the patient at the same time that, if a radical operation were to be done, he must submit to it immediately after the sections were examined. This he promised to do. The growth, which was situated on the left false cord, and about the size of a horse-bean, seemed to be an epithelioma. The patient was duly informed of this fact, and was urged to have the operation of partial laryngectomy performed at once. But, instead of agreeing to this, he insisted upon waiting for at least a month, stating that he had affairs of importance to attend to. Ten days after the intra-laryngeal operation, a swelling, about the size and form of half a horse-bean, was discovered over the left superior cornu of the thyroid cartilage. This ultimately proved to be a carcinomatous lymphatic gland.

CASE XXIV. (8).—*Carcinoma of posterior third of right vocal cord resembling in history and appearance a papilloma; partial removal by forceps; rapid increase of tumour and involvement of lymphatic glands.*—A female, aged fifty, suffered from a tumour on the posterior third of the right vocal cord, about the size of an orange seed. To the naked eye, the tumour presented the appearance of an inflamed papilloma, the mucous membrane was deeply injected, and the history of the case, a very chronic one, favoured the diagnosis of papilloma rather than of epithelioma. The patient was a nervous, excitable woman, and was extremely anxious about her condition. She had little or no discomfort or pain, save that arising from a sense of the foreign body in the throat. There was no lymphatic involvement, or pain on manipulation. From the uncertainty of the diagnosis, I was led to remove a small fragment of the growth, which presented the microscopic appearances of a papilloma, without the least likeness to the structure of an epithelioma. Shortly after this I removed a larger portion under the belief that the disease was benign, and that it might be cured by an intra-laryngeal operation. Following the second operation a

diffuse swelling appeared in the neck, not limited so as to suggest any infection of lymphatic glands. Seventeen days after the intra-laryngeal operation, this diffuse swelling subsided, and revealed two enlarged lymphatic glands, one on either side of the thyroid cartilage. At first these were supposed to be due to inflammatory changes, but the subsequent course of the case proved them to be carcinomatous in their nature; and the growth within the larynx, which, on examination of the first specimen, was believed to be a papilloma, ultimately, on examination of subsequent specimens, proved to be epithelioma, and the patient died from the disease.

No one can deny the importance of an early diagnosis, hence it does not devolve upon me to urge the necessity for it. But while this is so, I feel it to be a matter of very grave importance to recognise the dangers which, I have found by very unpleasant experience, may result from partial removal of carcinomatous growths. All who have had any experience of laryngeal cancer must have become assured of the fact that the tumour, when intrinsic in its origin, and not interfered with by instrumentation, may remain limited to the cavity of the larynx for a considerable time before secondary manifestations show themselves. Yet this is no reason for delay; on the contrary, if thyrotomies and laryngectomies are justifiable, it is only on the belief that cancer is primarily a local disease, which may be totally eradicated if the operation is performed at a sufficiently early date. But while on the one hand intra-laryngeal excision for microscopic purposes clears up the diagnosis in laryngeal carcinoma, it also exposes the patient to very serious dangers by increasing the rapidity of secondary new formations. The incision of a cancerous growth, or its partial removal, has justly been regarded as a most dangerous procedure, probably because the absorption of the infected material, whatever its nature may be, takes place rapidly from a wounded surface. For instance, judging from my experience of other similar cases, I should say that neither in Cases 7 nor 8 would the lymphatic glands have

become involved for months, had I not removed portions of the growth with forceps. In both instances, the tumour was limited in size, and in both, within a very short time after the intra-laryngeal operation, the lymphatic glands became involved.

In diagnosing cancer within the larynx the surgeon practically can bring only one sense, that of sight, to bear on the diagnosis, and for this reason he has been driven to employ a method of investigation which he would not consider justifiable when the cancerous growth is situated in external parts. It is only after a large experience that one is in a position to diagnose with certainty cases not characteristic, and I feel assured that if we were as careful to record our inaccurate diagnoses as we are to bring forward accurate ones, it would be found that intra-laryngeal interference with malignant growths has shortened the lives of many unfortunate sufferers. While conscious of the value of removing portions of a laryngeal neoplasm for diagnostic purposes, I desire to express my strong conviction that it should not be resorted to in cases suspected to be cancer unless the patient is willing to have a radical operation performed immediately after the diagnosis is completed.

I do not think it necessary to discuss, nor even to indicate briefly, the points which distinguish the products of tuberculosis, syphilis, and lupus, from non-inflammatory neoplasms.

Having now discussed the above mentioned general questions in diagnosis, we now come to consider the more minute differences which distinguish one variety of tumour from another. It is almost impossible to lay down any hard and fast rules, nor will I attempt to do so, but the following circumstances are worthy of attention, as distinguishing malignant from non-malignant growths.

In the former, especially in round-celled sarcoma and in soft cancer, the development of the symptoms and the growth of the tumour are rapid; whereas in the latter, as a general rule, the symptoms remain stationary, or nearly so, for a considerable time, often for years and the increase in the bulk of the neo-

plasm is practically imperceptible. One exception to the slow growth of benign tumours is papilloma, which, in many instances, grows with considerable rapidity. When the larynx is the seat of a benign growth, the mucous membrane may be hyperæmic, or slightly thickened by chronic catarrhal changes, but is not usually otherwise altered in appearance; whereas in malignant disease, especially in cancer, not only is the tumour ulcerated itself, but the mucous membrane is indurated, infiltrated with inflammatory products, and not uncommonly marked by erosions. Again, in cancerous disease, or when the larynx is occupied by a soft round-celled sarcoma, hæmorrhage may be a prominent symptom, especially if the patient suffer from paroxysms of coughing. This symptom is seldom present in non-malignant disease. Unless the larynx be the seat of prolonged and intense inflammation, enlargement of the lymphatic glands may be regarded as pathognomonic of cancer. In the sarcomata the glands are not affected. Another symptom which makes one very suspicious of cancer is pain, at first limited to the larynx, but subsequently radiating to the ear, cheek, and neck, on the affected side. In the early stages of the disease it is, in many cases, very difficult to come to a definite diagnosis. This is especially the case in the sarcomata. Associated with these tumours, you have not the distinctive symptoms, subjective or objective, that are present in the carcinomata. The patient seldom complains of pain; there is no enlargement of the lymphatic glands, or ulceration of the surface of the tumour; but still the tumour is malignant, and the patient incurs almost as great a risk to life as if he were the subject of a cancerous growth. Some growths which are homologous in their origin—for example, the papillomata and adenomata, may, at a later period of life, become heterologous, and develop signs of malignancy.

The diagnosis of intrinsic from extrinsic tumours is important, when we have to deal with malignant neoplasms—so important, that I will not apologise for repeating some statements which I have already made. By the term intrinsic, we mean to convey

the idea that the growth is strictly limited to the laryngeal cavity. When this is the case, the prominent symptoms are aphonia and dyspnœa. The lymphatic glands are seldom affected; as a rule, cachexia is not a prominent feature during the earlier stages of the disease, and dysphagia is not a common symptom. In patients suffering from extrinsic growths, on the other hand, aphonia is not usually present at the commencement of the disease, and, indeed, there may be only slight alteration in the voice; while dysphagia is, as a rule, present as soon as the growth has reached any considerable size. Pain in the larynx and pharynx, extending round the neck and to the ear of the affected side, is more characteristic of extrinsic than of intrinsic new formations. In the former, the glands also are involved at an early period, and cachexia is usually pronounced.

I now pass to consider the question of *prognosis*. In pre-laryngoscopic times the fact of a tumour being malignant or not was not of the same importance to the patient as it is now; because, in former times, if the tumour had a tendency to increase to such an extent as to cause obstruction to respiration, death was almost certain to result, whether the tumour were of one class or of the other. Previously to the middle of this century, there were few cases of successful extirpation of benign tumours, and surgeons looked upon all tumours of the larynx as clinically malignant. Certainly this was true from a strictly clinical point of view, in so far that they were almost certain to lead to the death of the patient.

The *prognosis* of malignant disease is in all cases unfavourable, but is worst in extrinsic carcinomata, most favourable in intrinsic sarcomata, while the intrinsic carcinomata may be said to occupy an intermediate position. In extrinsic cancer the disease is incurable, the growth spreads rapidly, the lymphatic glands become involved at an early date, and the patient is liable to die either from suffocation, from asthenia, from hæmorrhage, from sudden collapse, or from pyæmia; or the fatal termination may be induced by per-

foration of the œsophagus, by the formation of abscesses, or by pulmonary disease. If tracheotomy is performed at the proper time, life may be prolonged, and suffering for the time be mitigated, but more heroic surgical interference in cases of extrinsic carcinomata, offers little or no hope of success. Although the immediate prognosis is very unfavourable in all cases of cancer, it is much less so in intrinsic than in extrinsic growths. When the tumour is small in size, and none of the tissues external to the larynx have become involved, the hope of rescuing the patient from death may be entertained. If, however, the disease has spread beyond the limits of the laryngeal cavity, or if the glands have become affected, then a tumour, which at first may have been intrinsic, becomes quite as hopeless, as far as operative interference is concerned, as if the growth had been extrinsic from the beginning.

CHAPTER IX.

MALIGNANT DISEASE OF THE LARYNX—*Continued.*

Treatment—External operations for removal of Tumour.

THE *treatment* of malignant disease of the larynx may be divided into two kinds, palliative and operative. Regarding the former, the remarks to be made with respect to the measures adopted to relieve patients suffering from malignant disease of the tonsil apply also to cancer of the larynx.

In malignant disease where operative interference for the removal of the tumour is inadvisable, a palliative operation may be performed. The principal symptoms which call for relief are interference with respiration or with deglutition, and the presence of spasm or inflammation. When there is much pain it may be relieved by spraying the fauces and larynx with a 10% solution of cocain, or by insufflation with morphine and starch, or by inunction with an ointment containing morphine. The danger of death from suffocation may be averted by the timely performance of tracheotomy; and, in cases which demand this operation, it should be performed as early as possible. Opening the trachea is not in itself a dangerous operation, and, in my opinion, should be resorted to whenever there is the least indication of dyspnœa, especially if the surgeon is not likely to to be at hand when he may be required. It is remarkable how much relief a patient derives from the rest to the larynx, when the air ceases to pass by its natural channel. This was well illustrated in the patients C. M'W., (Case No. 3), and D. M'K., (Case No. 2).

The external operations for the removal of malignant disease are—(1) Section of the thyro-hyoid membrane, or supra-thyroid laryngotomy; (2) Section of the crico-thyroid membrane, or infra-thyroid laryngotomy or thyrotomy; (3) Section of the thyroid cartilage in the middle line; (4) Section of the entire larynx, or complete laryngotomy; and (5) Partial or complete excision of the larynx, or laryngectomy.

In performing any one of these operations, the patient should be placed on his back, with a firm pillow under his shoulders and the upper part of his chest, so that the thorax is raised, while the head is thrown backwards, and the tissues in front of the neck are put upon the stretch. The neck should be held perfectly straight by an assistant, while the operator feels for the thyroid cartilage; and, when the precise situation of the various parts of the larynx has been ascertained, the surgeon should grasp it between the fingers and thumb of his left hand, so as to render the skin moderately tense.

(1) Section of the thyro-hyoid membrane is performed by making an incision along the lower margin of the hyoid bone, which divides skin, superficial fascia, the sterno-hyoid muscle and the thyro-hyoid membrane, so that an entrance is made into the mouth between the base of the tongue and the epiglottis. This operation is only employed for the removal of growths occupying the upper part of the epiglottis; it is of no use when the tumour involves the interior of the larynx.

(2) Section of the crico-thyroid membrane is an operation which has hardly ever been performed for the removal of malignant disease, and, on account of the meagre access it gives, it is not one to be recommended.

(3) Section of the thyroid cartilage in the middle line. When section of the thyroid cartilage alone is to be performed, a vertical incision should be made in the middle line, from a little above the upper border of the thyroid cartilage to the upper margin of the cricoid. The edges of the wound should be held aside by retractors, and all bleeding points secured before the

larynx is opened. The only vessels that are likely to cause any trouble are the crico-thyroid arteries, which are firmly attached to, and anastomose over, the crico-thyroid membrane; if seen, they should be drawn down wards before the membrane is penetrated. A sharp pointed curved knife, or, when the cartilage is calcified, the point of a strong pair of scissors or bone forceps, should now be thrust through the crico-thyroid membrane, and the thyroid cartilage be divided in the middle line from below upwards, care being taken not to injure the interior of the larynx. When completely divided anteriorly, the two halves of the thyroid cartilage should be drawn apart by blunt hooks, and the interior of the larynx exposed to view, when the growth may be removed by scissors, by the knife, by the electric cautery, or by other appropriate means, according to the features of the individual case. Should, however, section of the thyroid cartilage not sufficiently expose the cavity of the larynx, then the incision may be extended downwards through the crico-thyroid membrane, or, if necessary (4), complete laryngotomy may be performed by subsequent section of the cricoid cartilage. If the growth is firmly attached to the cartilage, the external perichondrium should be separated from the part of the cartilage to which the tumour is adherent, and that portion of cartilage removed with the tumour.

These operations are not always applicable when the larynx is occupied by a malignant growth; under some circumstances, more complete removal is necessary.

When malignant disease attacks the larynx, in most instances more complete removal is demanded than is possible by the operations to which I have, up to the present, referred. (5) Laryngectomy, either complete or partial, is called for.

The possibility of an animal living after total extirpation of the larynx was first established by Albers, in 1829, while conducting a course of experiments upon dogs for the purpose of ascertaining to what extent the larynx participated in respiration. Koeberlé, in 1856, suggested the idea of removing the larynx

for disease; and, in 1866, the operation was performed for the first time by Dr Patrick Heron Watson, of Edinburgh. The operation was performed for syphilitic stenosis, but the case was not published. It was only in 1871 that the operation was introduced to the profession by Professor Billroth, of Vienna, who undertook it upon man, consequent upon the experimental investigations upon animals by Czerny, of Heidelberg.

I am firmly of opinion that cancer is primarily a local disease, and this view has been strongly supported at a recent discussion at the Glasgow Pathological and Clinical Society;[1] and so long as the system of lymphatics has not become involved in the new formation, I think it is quite possible that the patient may be rescued from death by the early performance of a radical operation. It is, however, a very different matter when the disease has spread beyond the laryngeal cavity. In such cases, laryngectomy seems to me unjustifiable, for two reasons: the immediate danger of the operation is greatly increased, and the possibility of eradicating the disease is extremely small; but I do not see any reason why an intrinsic carcinoma, which has not yet exhibited any evidence of glandular involvement, should not be removed with a good prospect of saving the patient. It is not my intention, at the present time, to enter into statistical details, but I think it my duty to indicate what I consider to be the elements of failure, and to point out suitable cases for operation. Looking at the subject broadly, I may say that death has been due, in the majority of cases, to the immediate dangers of the operation, and, later on, to recurrence of cancer. The causes of death immediately following the operation, are collapse, pyæmia, pneumonia, and hæmorrhage. These dangers must, therefore, be carefully guarded against; the first mentioned may be, to some extent, avoided by carefully preventing loss of blood during the operation, and by feeding the patient as soon as he is able to digest food. Pyæmia may be prevented by the free use of antiseptics during the first few days following the

[1] *Glasgow Medical Journal*, vol. xxv.

operation. Iodoform is the most easily applied, and, if carefully watched, the most satisfactory that we have at our disposal; but the drug, if inhaled, may, in certain cases, cause very alarming symptoms. Therefore, although iodoform may be used to disinfect, or rather to prevent infection of the wound, it is not safe to apply it too freely to the tracheal tube by means of warm sponges. The danger of pneumonia, on the other hand, may be minimised by keeping the air of the apartment aseptic, moist, and at an equable temperature. Care should also be taken to prevent any fluid from the wound, or food, from entering the air-passages, and this can be easily done by using a large-sized tracheotomy tube, which completely fills the trachea. The period when pneumonia is apt to develop is during the first fortnight. This time bridged over, the life of the patient may be regarded as safe from this complication.

I will now describe the steps of the operations, first, for total, and, second, for unilateral laryngectomy. Tracheotomy should be performed seven days previously to the operation of extirpation. In performing excision of the larynx, I make a median incision from the lower edge of the hyoid bone to the tracheotomy wound, situated on a level with the second ring of the trachea. The skin and the subcutaneous tissues are then dissected from the thyroid cartilage in front, the anterior margin of the thyro-hyoid muscle exposed, and the substance of the muscle separated from the upper part of the cartilage by the handle of the knife, while the origin of the muscles from the oblique line on the side of the thyroid cartilage are divided by incision as far back as the pharynx. This should be done first on the left, then on the right side. The other muscles, namely, the sterno-thyroid and the inferior constrictors, are then dissected off, the edge of the knife being kept close upon the cartilage. The cricoid cartilage is then dissected out, and the upper ring of the trachea exposed. When this has been done, the trachea should be drawn forwards and upwards, and divided below the first ring. Up to this stage of the operation, chloroform is administered

through the tracheotomy tube; but, now that the trachea is divided transversely, it is necessary to introduce a large-sized tracheal tube (Macewen's), with an indiarubber ring round the end in the trachea, in order to prevent blood from flowing into the air-passages, and also to permit chloroform to be administered at a little distance from the operator. The membranous posterior wall of the trachea is then carefully dissected from the œsophagus; the superior cornu, and upper part of the left ala of the thyroid, are then cut through and separated from the rest of the cartilage, so as to permit the posterior part of the larynx to be more readily dissected from the pharynx. The thyro-hyoid membrane is then divided in front, the epiglottis divided at its base, and the upper attachments of the larynx are cut through. The portion of cartilage which has been separated from the thyroid should be then removed. All bleeding points having been secured, the trachea is stitched to the lower edge of the wound, and a large-sized tracheotomy tube is fixed in position. The wound should be dressed with absorbent cotton-wool sprinkled with iodoform, and enclosed in a casing of perforated green silk protective tissue.

The patient is then placed in bed and no food administered until the evening, when a feeding tube may be introduced into the œsophagus, through the upper part of the wound, and retained in position by a piece of sticking plaster.

In performing this operation, I divide the trachea and remove the larynx from below upwards. Some surgeons, however, prefer to do it in the opposite direction; this is a more tedious method, but it avoids the risk of blood entering the air-passages, on account of the severance of the larynx from the trachea being the last step in the procedure. These advantages are, however, counterbalanced in the method which I adopt by the circumstance that the operation can be performed more rapidly; while, by using a flexible gum-elastic tracheal tube, of sufficient size to fill the trachea, not only can the escape of blood into the lower air-passages be prevented, but the anæsthetic and the hands of

the administrator are removed to some distance from the field of operation.

One point to which I desire to direct attention is, the advantage of dividing the thyroid cartilage close to its upper posterior angle. By separating the superior cornu before dissecting the larynx from the œsophagus, the operation is greatly facilitated, and the danger of injuring the œsophageal wall, or large arteries, is removed. Some operators ligature the superior and inferior thyroid arteries, and if necessary the superior laryngeal, or even the hyoid branch of the lingual artery, as a preliminary to the operation of extirpation; but as far as my experience goes, the hæmorrhage is by no means great, and can easily be controlled.

Unilateral laryngectomy is performed by making an incision down the middle line from the level of the hyoid bone to that of the cricoid cartilage, while another is made along the lower margin of the hyoid bone. The soft parts are then separated from the cartilages on the diseased side; and, after the larynx has been exposed, the thyroid cartilage is split, and the interior of the cavity exposed to view. If, on inspection, the disease is found to be limited to one side, the affected parts are removed; but if not, the cricoid cartilage is not divided from above downwards, but is severed from the trachea transversely, the larynx is dissected from below upwards, and complete extirpation is performed.

Before concluding this chapter, it is necessary for me to say a few words with reference to the treatment of the patient preliminary to the performance of extralaryngeal operations.

The operation, whatever its extent, should be preceded by tracheotomy, which should be performed at least a week in advance. In most cases calling for extralaryngeal interference, the patient suffers from dyspnœa, and consequent engorgement of the pulmonary vessels. This is relieved by the free entrance of air through the tracheotomy tube. Another reason why the trachea should be opened as a preliminary measure is, that the

physical examination of the chest by auscultation is facilitated, especially in cases in which the entrance of air through the larynx is noisy. Moreover, the patient becomes habituated to the entrance of air through an artificial opening, and the irritation produced by the wound leads to adhesion of the trachea to the surrounding integuments. High tracheotomy should be performed; it does not practically interfere with the further steps of the operation, whereas low tracheotomy causes two wounds instead of one.

I will now say a word or two in respect to the after-treatment in cases of laryngectomy. The edges of the wound should not be brought together by sutures, but the cavity should be packed either with a sponge wrapped in perforated green silk, a method which I adopted in my first case; or there may be substituted for the sponge, absorbent cotton-wool sprinkled over with iodoform or some other antiseptic. The dressings should be replaced every twelve hours, and the surrounding atmosphere should be kept at a temperature of 70° Fahr., and warm sponges, sprinkled with iodoform, should be applied at short intervals over the opening of the tracheal tube. Care should be taken not to apply the iodoform too freely on warm sponges. The vapour of the antiseptic is rapidly absorbed by the lungs, and, in certain cases, symptoms of iodoform poisoning suddenly develop.

The great object for the first few days, that is to say, until the surface of the wound has become covered with healthy granulations, is to keep the discharges thoroughly aseptic, and to prevent, by use of a large tracheal tube, the possibility of their entering the air passages. Nourishment, and, if required, stimulants may be supplied through a tube introduced into the œsophagus, either by the mouth, or through the wound.

During the first few days after the operation, the only food required is milk, and this should be supplied at the rate of three or four pints in twenty-four hours. When the wound has become firm, the patient may be encouraged to take food by the mouth, and an artificial phonatory apparatus, such as

Dr Irvine's modification of Gussenbauer's artificial larynx, may be introduced, and the edges of the wound drawn over the upper or pharyngeal limb by strips of sticking plaster. This instrument differs from the original tube devised by Gussenbauer in the following respects. The mechanism of the two limbs is reversed, so that the pharyngeal tube, in place of being introduced through the tracheal tube, is passed first, and the other limb is introduced through it. The phonatory reed is carried by the tracheal tube, and may be drawn out and in with great ease.

I may now conclude with a remark or two with respect to the symptomatic treatment of cases of malignant disease which are unsuitable for operative interference. Life may be prolonged and rendered more tolerable, if the tumour causes dyspnœa, by the performance of tracheotomy, an operation which not only permits free access of air to the lungs, but, by relieving the œdema and inflammation of the upper air passages, facilitates deglutition. Dysphagia may be relieved by the introduction of an œsophageal tube, or by spraying the pharynx with a solution of cocain. Pain, on the other hand, may be alleviated by insufflations of starch containing a sixth to half a grain of morphine; or, what I consider even better, an ointment containing morphine may be applied to the larynx externally by inunction. It is said that hæmorrhage may be restrained by the hypodermic injection of ergotine; while, to some extent, the general constitutional disturbance may be modified by the administration of preparations of arsenic. The prospect of alleviating suffering in these sad cases is small, and usually, within a few months, the glands become implicated, and the patient dies. We, however, look forward to the time when very few cases of intrinsic cancer shall be permitted to involve the lymphatic system without an attempt being made to remove the primary growth, either by partial or complete laryngectomy. In order that this end may be achieved, it is absolutely necessary that the disease be recognised at an early stage.

CHAPTER X.

MALIGNANT DISEASE OF THE LARYNX—*Continued.*

Statistics showing value of External Operations.

The statistics of operations for the cure of malignant disease of the larynx have been from time to time most carefully compiled. My distinguished predecessor in the Royal Infirmary, the late Dr David Foulis, was the first to collect cases of excision of the larynx for statistical purposes, but since his time valuable additions have been made by Blum, Burow, Solis-Cohen, Zesas, Hahn, Wolfenden, Baratoux, Scheier, Butlin, Wassermann, Schwartz, Medycyna, Semon, Pinçonnat, and Kraus. Taking the statistics of the two last-mentioned observers we get the following results.

Pinçonnat[1] collected 220 cases, of which 171 were examples of complete, and 47 of partial, extirpation of the larynx. Of the former, 154 operations were performed for cancer, 9 for sarcoma, and 8 for other affections. Of the 154 cases of cancer, 83 were alive after one month, and 26 lived over ten months. Again it may be observed that 17 lived over one year, 3 lived from two to three years, 4 lived from three to four years, and 3 lived over four years. In 9 cases of complete extirpation for sarcoma, 1 lived for one and a-half years, 1 lived over two years, and 1 lived for ten years.

Taking now the cases of partial extirpation of the larynx, of which 47 cases are collected, 43 of cancer, and 4 of sarcoma.

[1] "De l'extirpation du larynx." Thèse, Paris, 1890."

Of these cases, 7 lived more than one year, 1 lived more than four years, and 1 lived more than seven years: 3 of the cases of partial extirpation for sarcoma are reported as cured.

In contradistinction to these statistics we may now take those collected by Kraus.[1] He reports 240 cases of extirpation, 160 total and 80 partial. Of the former, 142 were performed for cancer. In 10 of these the result of the operation is unknown, but of the remaining 132, 57 died within two months, 25 remained well for at least one year, 13 for more than two years, and 1 for more than nine years.

Of the 80 cases of partial extirpation of the larynx, 16 were reported free from disease a year after the operation, 8 cases were well after two years, and 1 case eight years.

The following table is compiled from Wassermann's[2] and Butlin's statistics. (See next page).

In the *British Medical Journal* of 23rd August 1890, Mr H. T. Butlin remarks regarding his own cases.—"With the assistance of Dr Kanthack, 102 operations for intrinsic carcinoma have been collected from various sources. They were performed on 95 patients by various surgeons in different parts of the world. In the very large majority of them there is not the least doubt of the intrinsic origin of the disease. In some the account of the characters and situation of the disease is not quite so clear as I should have wished, so that it is just possible that a very few cases of extrinsic carcinoma have been admitted into the tables. But if this be so, these cases certainly do not tend to make the tables better, so that if a fault has been committed in this respect, it certainly is not a fault which will tell to the advantage of my theory. The 102 operations contain 28 cases of thyrotomy, with the removal of the diseased parts in the interior of the larynx, 23 cases of partial, generally half, excision of the larynx, and 51 cases of complete excision of the

[1] "Contribuzione alla Statistica dell' extirpazione della laringe." Policlinico, 1890, No. 4.

[2] Über die Exstirpation des Larynx, Leipzig, 1889.

A.—Table compiled from Butlin's and Wassermann's Statistics, showing Results of Extirpation of the Larynx for Malignant and other Diseases.

			1.	2.	3.	4.	5.	6.
		No. of Cases.	Deaths within 14 Days.	Deaths beyond 14 days and within 2 Months.	Recurrence.	Death from Intercurrent Disease.	So-called Cure.	No Recurrence within 3 Years.
Total Extirpation for Carcinoma, . .	Before 1881.	41	P. cent. 22=53.65	P. cent. 3= 7.31	P. cent. 11=26.83	P. cent. 2= 4.87	P. cent. —	P. cent. 3= 7.31
	After 1881.	80	19=23.75	9=11.25	29=36.25	9=11.25	9=11.25	5= 6.25
	Total,	121	41=33.88	12= 9.92	40=33.05	11= 9.09	9= 7.44	8= 6.61
Partial Extirpation for Carcinoma, . .	Before 1881.	10	3=30.	1=10	5=50	—	1=10	—
	After 1881.	45	13=28.88	8=17.77	9=20	3= 6.66	9=20	3= 6.60
	Total,	55	16=29.09	9=16.36	14=25.45	3= 5.45	10=18.18	3= 5.45
Total Extirpation for other Diseases, .	Before 1881.	7	1=14.28	2=28.57	2=28.57	—	—	2=28.57
	After 1881.	12	5=41.66	—	2=16.66	2= 6.66	3=25	—
	Total,	19	6=31.58	2=10.52	4=21.05	2=10.52	3=15.79	2=10.52
Partial Extirpation for other Diseases, .	Before 1881.	8	1=12.50	—	1=12.50	5=62.50	—	1=12.50
	After 1881.	16	1= 6.25	1= 6.25	2=12.50	2=12.50	6=37.50	4=25.00
	Total,	24	2= 8.33	1= 4.17	3=12.50	7=29.17	6=25.00	5=20.83
Thyrotomies for Intrinsic Carcinoma, .		28	3=10.7	—	13=46.4	1= 3.6	8=21.4	3=10. 7
Partial Excision for Intrinsic Carcinoma, .		23	7=30.4	—	6=26	—	5=22	4=17. 4
Complete Excision for Intrinsic Carcinoma,		51	16=31.4	—	17=33.3	6=12	—	8=16

larynx. In considering the results it will be convenient to take first the deaths which were due to the operations; secondly, the patients who may be regarded as cured by operation, and, thirdly, the relief afforded to patients who were not cured. This division is adopted in accordance with the scheme of a book on 'The Operative Surgery of Malignant Disease,' published by the author in 1887."

"*Deaths due to the operation.*—The 28 thyrotomies were performed on 27 patients, of whom three died from the results of the operation—a larger proportion than might have been expected from what we are in the habit of considering as a not very severe operation. In one case, however, the death was due to what may be fairly called an accident, for owing to a mishap with the cannula, acute œdema of the lungs set in, which proved fatal within thirteen hours of the operation. The 23 partial excisions were performed on 23 patients, of whom seven died of the operation. The 51 complete excisions were performed on 51 patients, of whom six had been previously subjected to the operation of thyrotomy. Sixteen patients died of the operation. There were thus 26 fatal cases in 102 operations, and it is very interesting and very instructive to study the causes to which the deaths were attributed. One patient, to whom reference has been made, died of what may be called an accident; one died of secondary hæmorrhage; two of paralysis of the heart, and three of exhaustion. In three cases the cause of death was not correctly ascertained. One patient died of pleurisy, and six of pneumonia or broncho-pneumonia or pleuro-pneumonia. In the remaining nine cases the cause of death was some form of septic poisoning. Taking into account the severity of many of the operations, and the condition of the patients at the time at which they were performed, the mortality under what may be termed ordinary causes of death after severe operations, such as hæmorrhage and exhaustion, is not very large. The excessive mortality lies in the special causes of death which are associated with these operations, namely,

affection of the lungs (Schluck-pneumonie) and septic poisoning. The mortality under these heads is far from encouraging."

"In accordance with the scheme which has been usually adopted of late years, I shall only regard those persons as cured who were free from disease at least three years after the last operation. Taking first the cases of thyrotomy, the total results were that three persons died of the operation; in thirteen cases the disease recurred; eight patients recovered and were well at various periods, but sufficient time had not elapsed to allow of their being regarded as cured; and one patient died at the end of thirteen months without recurrence of the disease. In three cases the operation may be regarded as wholly successful, for one of the patients died four years afterwards of cerebral apoplexy at the age of sixty-seven, the second was well at the end of eight, and the third at the end of twenty years. Of the patients (twenty-three in number) on whom partial excision was performed, seven died of the operation, six suffered from recurrence of the disease, five recovered and were well at the end of various periods within three years, and one died at the end of two years and a half without recurrence of the disease. Four patients may be claimed to have been cured, for three were well at the end of three years and a half, four years, and four years after the operation, and a fourth died at the end of five years, of apoplexy, at the age of sixty."

"Of the fifty-one cases of complete excision, the operation proved fatal in sixteen, the disease recurred in seventeen, four patients recovered and were well at the end of various (for the most part short) periods, and six died of other causes. Of these six, four died within a few months—two of pneumonia, and two of apoplexy, or more probably asphyxia, the fifth at the end of twenty months, of alcoholism, and the sixth at the end of about two years, of inanition. In this case no cancer was found after death, although the manner of his death strongly suggests that it was present in one or more of the internal organs. Eight patients may be claimed to have been cured, for seven were well

at the end of three years and a half, four years (2), four years and a half, five years, five years and three quarters, and nine years after the operation, and the eighth died at the end of four years and a half without recurrence of the disease. Some of these patients were employed in avocations which must be regarded as laborious—one man in a riding school, and a woman as a laundress. The total results, then, so far as cured cases are

B.—Table showing the Results of Operations as regards Cure.[1]

I. Total Extirpation of the Larynx.—	
(*a*) Cases of cure, well beyond three years—	
In intrinsic carcinoma, . . .	16%
In intrinsic and extrinsic carcinoma, .	6.61%
In other diseases, ...	10.25%
(*b*) So-called cures—	
In intrinsic carcinoma, . . .	0
In intrinsic and extrinsic carcinoma, .	7.44%
In other diseases, ...	15.79%
(*c*) Recurrence—	
In intrinsic carcinoma, . . .	33.30%
In intrinsic and extrinsic carcinoma, .	33.05%
In other diseases, . . .	21.05%
II. Partial Extirpation of the Larynx.—	
(*a*) Cases well beyond three years—	
In intrinsic carcinoma, . . .	17.40%
In intrinsic and extrinsic carcinoma, .	5.45%
In other diseases, . . .	20.83%
(*b*) So-called cures.	
In intrinsic carcinoma, . . .	22.00%
In intrinsic and extrinsic carcinoma, .	18.18%
In other diseases, ...	25.0%
(*c*) Recurrence.—	
In intrinsic carcinoma, . . .	26.00%
In intrinsic and extrinsic carcinoma, .	25.45%
In other diseases, ...	12.5%

The results of thyrotomy are shown in Table A, page 120.

[1] Compiled from the statistics of Butlin and Wassermann.

concerned, are that fifteen patients were alive and free from disease, or died of some other disease than cancer, at periods of from three to twenty years after the last operation—a result which will compare favourably with those afforded by operations for malignant disease of the testicle, the tongue, the upper jaw, or even of the breast, were it not that operations on the larynx are so much more fatal than those on the testicle, the tongue, and the breast."

Wassermann in his monograph published a collection of 219 operations in all. Of these, 66 were performed previous to 1881, table A, column 1, and give a mortality (within a fortnight of the operation) of 27, or about 41°/₀; whereas the remaining 153 operations done since that date showed a death rate of only 24.8°/₀, showing that considerable improvement has taken place within the last ten years regarding the mode of operating. But if we now look at column 2, in which the deaths occurring within two months of the operation are given, it will be seen that the mortality previous to 1881 is equal to 9°/₀, and subsequent to that date, 11.7°/₀. The operations were performed for carcinoma of intrinsic and of extrinsic origin, for sarcoma, for tuberculosis, for papilloma, and for stenosis. In 121 cases of complete excision of the larynx for cancer, only 8 complete cures are recorded, that is to say, instances in which the patients remained well beyond three years after the operation. The following is the list of cases in which recurrence did not take place, and the name of the operator.—

1. Thiersch,	4½	years	after operation,	death, catarrhal pneumonia.
2. v. Winiwarter,	4½	,,	,,	,, apoplexy.
3. Gussenbauer,	7½	,,	,,	well.
4. Gussenbauer,	6	,,	,,	death, pleuritis.
5. Gussenbauer,	5¾	,,	,,	well.
6. Fischer,	3½	,,	,,	,,
7. Schede,	4½	,,	,,	,,
8. Bergmann (Riga)	4	,,	,,	,,

There are also two completely successful cases of total extirpation of the larynx for disease other than cancer.

The importance of distinguishing between intrinsic and extrinsic disease is clearly shown in the above table. Krishaber laid down a law, that so long as the primary cancerous growth remained limited to the interior of the larynx, the lymphatics do not become involved, while in tumours of extrinsic origin the glands become affected at an early period in the history of the case. I think it must be admitted that this theory is correct for all practical purposes.

Taking all points into consideration, the question must be answered:—In a case of malignant disease of the larynx should a radical operation be attempted, or should the patient be simply relieved by performing tracheotomy? This I will answer in two ways, by a consideration of statistics, and by a reference to my own cases. On looking over Table A, a thought at once occurs to the mind,—Taking the cases in the aggregate, has human life been prolonged by so-called radical operations? No one can deny that in many instances life has been shortened by the operation. Certainly a 27·2°/₀ average death rate within fourteen days of the operation must be put down on the wrong side of the account. On the other hand, in certain cases we have the prolongation of life even although cure is not effected, and again we have an average of 17·2°/₀ of so-called cures, and an average of 11°/₀ of cases which have lived over three years without recurrence. Such are the general results of all the radical operations for malignant disease of the larynx, and their relative value can now be measured pretty accurately; but when we come to try to contrast them with tracheotomy, we find that statistics help us very little, and we require to fall back on individual experience. For my own part, I regard tracheotomy as a most valuable operation in malignant disease; when performed early, even before there is much obstruction to breathing, the rest which it affords to the larynx certainly retards the progress of

the disease. The operation is practically free from danger; out of twenty-seven tracheotomies which I have performed for malignant disease, in only one case was the result fatal, but death in this instance was almost to be expected. The patient, who was eighty years of age, suffered from an intrinsic epithelioma causing great dyspnœa, also from chronic bronchitis, emphysema, and dilatation of the right ventricle, with tricuspid regurgitation. He died on the fourth day after the operation, from syncope.

With regard to the choice of operation in individual cases, this is often most difficult, as very seldom does the full extent of the disease appear on a laryngoscopic examination. Only its uppermost limits are clearly made out, and it may therefore be laid down as a general rule that the disease is more extensive than it appears. If the disease is extrinsic, tracheotomy is the only operation justifiable; but should the disease be clearly limited to the cavity of the larynx, then a tracheotomy may be followed by an exploratory thyrotomy, and, when the disease has been thoroughly inspected, then the surgeon may make up his mind as to what is further required. I fully agree with what Mr Butlin says regarding the choice of an operation. He remarks:—"I look for the greatest success in future from what may be termed atypical operations, that is, operations which are directed first to the excision of the disease and its surroundings, without reference to the removal of one-half or the whole of the larynx." The feeling on the part of the surgeon that he must perform a recognised or a "classical operation," instead of doing simply what he finds to be required, is a wrong one. In cases of intrinsic carcinoma, should a thyrotomy show that the cartilaginous structures of the larynx are involved, I am doubtful if much benefit is derived from excising these, as they are seldom affected at a period when the tumour is of such a size as to hold out any hope of complete removal; and, again, in cases of extrinsic malignant disease, statistics show that the immediate risk to life is very great, and the hope of doing good

very small. My own experience, as well as the statistics referred to above, show that thyrotomy, or partial excision of the larynx, saves or considerably prolongs life in from thirty to forty per cent. of the cases in which the malignant tumour is removed early, and this leads me to say that it is not the precise method of operating that should attract and hold the surgeon's attention. His whole aim should be to attack the disease as early as possible, at a time when it may be entirely removed.

CHAPTER XI.

MALIGNANT DISEASE OF THE NASAL FOSSÆ.

Malignant Disease in the Nasal Fossæ—Three cases of Sarcomata and two cases of Carcinomata, with general remarks on these diseases.

FIVE cases of malignant disease in the nasal fossæ form, as it were, the text of this and the succeeding chapter. Of these, two patients have been cured by operation, neither of them having shewn any tendency to recurrence of the disease within twenty-three months of the operation. One was a round-celled sarcoma (Case 1), the other a myxo-carcinoma (Case 5).

CASE XXV. (1).—*Round-celled sarcoma of septum; duration seven or eight weeks; sudden formation and rapid growth; complete removal, with cure.*—The patient, a woman, æt. 29, was admitted into the Glasgow Royal Infirmary, March 19, 1890, complaining of obstruction in the right nostril, accompanied by constant dull aching pain, and slight nasal discharge. The patient stated that she could breathe quite freely through the right nostril until seven weeks previous to admission, when she suffered from what she believed to be "a cold in the head," and she noticed that the obstruction daily became greater. On examining her nose, she observed a whitish-looking mass which blocked the nostril, and this growth, she said, increased in size very quickly, so that, on admission, three weeks after the tumour was first noticed, not only was the right nostril blocked, but the swelling had caused considerable bulging externally. For the last three weeks there was considerable

pain occasioned by the pressure of the growth. It was, however, not continuous, but rather intermittent in character. She also suffered from a continuous aching pain in the forehead, which she distinguished distinctly from the pain just referred to. On examination a pale, smooth, firm, tumour was observed on the right side of the septum, to which it was attached by a broad base. The growth had the form and size of a half of a large walnut. The rounded portion pressed firmly against the turbinated bodies, and externally there was a good deal of bulging. The examination caused a small quantity of blood to escape, but the patient said that on no other occasion had she noticed the discharge tinged with blood. I was very suspicious respecting the nature of the tumour, and therefore removed a small portion of it for microscopic examination, which showed it to be a round- and spindle-celled sarcoma. I therefore, by reflecting the right side of the nose, exposed the tumour freely, and removed it completely, the base of the growth being subsequently cauterized. Patient came to the out-door department on the 5th April 1892, perfectly well, 25 months after the operation, and no evidence of an operation having been performed is seen even on critical examination.

Round-celled sarcomata usually grow very rapidly; but not always, as is well illustrated by two cases which came under my notice in private practice, the details of which I think worthy of attention.

CASE XXVI. (2).—*Small round-celled sarcoma of left middle and superior turbinated bodies, repeated and profuse hæmorrhage, checked occasionally by treatment. Severe pain, displacement and protrusion of eyeball; somnolence, death by coma sixteen months after onset of the disease.*—Mr M., æt. 64, consulted me on the advice of Dr Archd. Brown of Mount Florida, in May 1887. The history given to me at the time by the patient was as follows:—About three months ago he began to experience a difficulty in breathing through the left nostril, and at the same time the discharge was noticed to be excessive, and occa-

sionally tinged with blood. Since then, on several occasions, epistaxis has been severe and prolonged. The patient does not complain much of pain, but suffers considerably from interference with nasal respiration, and, when the hæmorrhage is severe, he feels very weak. The discharge also troubles him on account of its quantity and fœtid odour. Examination of the nostrils and posterior nares revealed the presence of a small soft vascular tumour, growing from the posterior part of the superior turbinated body, together with considerable thickening of the mucous membrane of both nostrils. As the diagnosis in respect to the nature of the tumour was not clear at the time, palliative treatment was employed for the purpose of restraining the hæmorrhage, and if possible reducing the swelling of the mucous membrane, so that a more complete view might be got of the tumour.

During the early summer months (1887) the symptoms were ameliorated, and the patient's general health improved somewhat, but, towards the end of August, while residing at Rothesay, a very severe attack of epistaxis occurred. So profuse was the hæmorrhage that the anterior and posterior nares required to be plugged, and for some days he was too weak to be removed to Glasgow. Early in September he called on me; on examination I found that, while the condition of the mucous membrane had improved in appearance, the tumour had increased in bulk, and was even more vascular than formerly. The general condition of the patient was not such as to justify me in recommending a radical operation, even although such a procedure had been considered requisite, but, when it was also known that, from the situation of the tumour, complete removal was impracticable, the question of serious surgical interference was at once set aside. The only operation resorted to was to remove as much as possible of the tumour with the electric écraseur, for the purpose of temporarily restraining the hæmorrhage. In this the operation was successful for the time being, but hæmorrhage recurred within a few weeks. The portion of the tumour removed was the size of a large walnut, and presented the

following appearance:—To the naked eye it was of a pale pink colour, very soft and pulpy, its surface was irregular and frayed, not unlike the appearance presented by the chorion previous to the formation of a placenta. When hardened for a few days in spirits the growth shrunk to about a fourth of its original size, and on microscopic examination exhibited the structure of a small round-celled sarcoma.

The subsequent history of the case was a very sad one. The hæmorrhages became more frequent and profuse, and latterly almost continuous; the patient's appetite gradually failed, and suffering much from dyspepsia, his strength steadily diminished.

The following observations are taken from a letter I received from Dr Archd. Brown:—"After the last operation the hæmorrhages continued to occur at intervals, but in the course of time the patient began to suffer from other symptoms, due, no doubt, to the rapid growth of the tumour; severe neuralgic pains troubled him day and night, yielding only temporarily to powerful sedatives. Obstruction to the lachrymal duct occurred, resulting in abscess. Latterly indications of displacement and protrusion of the eyeball were observed. This condition gradually increased until the patient's expression was totally altered. The general weakness was now very marked, induced partly by bleeding and by pain and sleeplessness. A few days before death the patient became somnolent, but not to any very pronounced degree, except as contrasted with his previous state. The somnolence, however, suddenly passed into coma, which, after twenty-four hours, ended in death on May 20, 1888," about sixteen months after the onset of the symptoms.

The other case I was asked to see for the first time in December 1890. It was one which interested me very much at the time, and I presume that a short account of the history of the case may also be of interest to the reader.

CASE XXVII. (3).—*Round-celled sarcoma of left middle turbinated body. Slow growth of tumour, followed by rapid repeated copious hæmorrhages; ultimate involvement of the base of the skull*

and brain, ending in death from coma.—The patient, T. W., aet. 46, was sent to me by Dr William Snodgrass, of Partick, who furnished me with a very complete history of the case. From his report it appears that the patient "noticed in September 1889 that occasionally fleshy-looking masses came from the left nares on blowing his nose, unaccompanied by hæmorrhage to any extent, and not causing much pain. Soon after these masses began to come away regularly about once a-week. The patient then consulted Dr Miller, of Largs, who removed similar fleshy masses, and advised washing the nares with sea-water. In February 1890 he had considerable anxiety from business and other matters. The fleshy masses still continued to come away, and he continued washing the nares as directed by Dr Miller. Toward the month of November 1890 he began to experience a 'choky' sensation when eating, and had frequent slight attacks of epistaxis. He also suffered from headaches of a neuralgic kind, which occasionally lasted three or four days, and were sometimes relieved after an epistaxis, but not always. Mr W. consulted me on Tuesday, December 2, 1890, regarding the above symptoms. The lower turbinated bone on the left side seemed to be enlarged and hyperæmic. I therefore advised the patient to consult Dr Newman, whom he saw for the first time on Thursday, December 4. He resumed work on the railway next day, and when he was engaged writing, about 9·40 p.m., he noticed that he had made a mistake in addressing a letter. He tore up the paper and wrote the name correctly on a fresh envelope, but this time he made a mistake in the first line of the address. He then tore up the second envelope, and on a third one he wrote the name and first line of address correctly, but made a mistake in second line of the address. He then stopped work and walked home, about two miles, and he found, on entering the house, that he could not speak to his wife. I saw him about 11 p.m. He was then able to describe the occurrence in a perfectly connected manner. The pupils reacted normally to light. He had no pain in the head, but spoke of flashes of light

in the left eye. He remained in bed till Monday, December 8. On that day he went for a short time to work, but on returning to the house he spoke of a feeling of cold in the right arm, leg, and on the same side of the body, although no difference in temperature between the two sides was appreciable by others. On December 25 he rose and felt fairly well, but toward evening his friends noticed that he began to talk incoherently, and I was called to see him. When I arrived I found that he was able to answer questions quite correctly, and seemed generally in a perfect state of consciousness. The pulse was slow and regular, about 50 per minute; the pupils small, but reacting normally and equally to light. The eyelids were slightly œdematous, as were also the cheeks, but there was no other trace of œdema about the body; he experienced no pain. He was somewhat pale, with brownish earthy tinge on face and neck; the breath had an odour of stale vinegar; there was no excessive thirst nor hunger, but he was weaker than he used to be, although still fairly strong. Urine when examined showed no albumen, but oxalates of lime and a considerable amount of sugar were present. A slight degree of mental wandering was noticeable for several days. Previous to December 29, and on that day, the patient had an attack of epistaxis, in which about two teacupfuls of blood were said to have been lost. This was checked by the application of iced cloths to the forehead and the nose. It returned again, however, on Tuesday 30, and was again checked by applications of ice. It was noticed that he now became somewhat more intelligent. Pulse soft, slightly irregular; tremors of right hand were noticed, but no other sensory or motor disturbance, and he answered questions clearly. The epistaxis returned again on Wednesday 31. On Thursday, January 1, 1891, the hæmorrhage was checked by use of injection into nostril of equal parts of tinct. ferri perchlor. and water. On Friday 2, epistaxis in considerable amount, and marked fœtor from nasal discharge. Pulse soft and irregular, 120 per minute; nares plugged with cotton wool impregnated with iodoform; in-

continence of urine, and slight ptosis of right eye. He can open the eyelid about half-way, but he cannot tell his right leg from his left. Slight hæmorrhage on Saturday, January 3, and Sunday, January 4; incontinence of urine and fæces; considerable tremor in the right arm; increased ptosis; no complaint of pain. He swallows liquids well, but he has had difficulty in swallowing solids; pulse irregular in force, and frequently 115 to 125; temperature 101°. On Monday 5, only a trace of hæmorrhage from the nostril. The left nostril was now blocked by the growth; the patient answered most questions intelligently, and he could move his arms and legs, but the movement of right eyelid was still deficient; pupils small, but reacting to light; paresis of both hands; carphologia. He talks incoherently, but lies perfectly at rest in bed; incontinence of urine and fæces still present. The fæces were very liquid, and of a dark brownish colour; temperature in the evening, 100.4°; pulse very irregular in force and frequency. Tuesday morning, temperature, 100.2°; pulse, 120; any attempt to open the right eye was resisted, but he moved both hands and feet; marked paresis, with tremor of hands, and signs of nausea when given food. This passed off during the day. Evening temperature, 101.2°; Wednesday, January 7, morning pulse, 140; temperature, 100°; respiration, 35; tremors more marked; now his attention cannot be aroused. Evening pulse too irregular and weak to be counted; temperature, 102.2°; respiration, 40.

"Patient died at 2·15 a.m. on Thursday, January 8, in a state of coma."

When I saw the patient for the first time on December 4, 1890, little could be made out on account of the presence of blood clot, which, with the swelling, completely blocked the left nostril. After washing the nostril as well as possible, a bleeding point was seen at the lower extremity of a diffuse swelling, which almost filled the nares. The surface was smooth and covered, as far as could be seen, by healthy or slightly hyperæmic mucous membrane, and it looked altogether like

a great hypertrophy of the middle turbinated body. I touched the bleeding point with the electric cautery, and sent the patient home. I did not then suspect the existence of malignant disease, but at the next visit (December 11), from what the patient told me, and from the appearance of the growth, which had now fungated, it was very evident that the disease was sarcoma.

This case illustrates well the difficulty in diagnosis of sarcoma, and shows how closely it may resemble, even at a late stage of the disease, simple hypertrophy of the turbinated bodies.

Besides round-celled sarcomata and spindle-celled sarcomata a few examples of melanotic and pigmented sarcomata have been recorded by Heymann ([17])*, Lincoln ([22]), Osio ([30]), and Viennois ([41]), while cases of myxo-sarcoma, myelo-sarcoma, glio-sarcoma, alveolar sarcoma, and adeno-sarcoma, have been seen by Viennois ([41]), Sargent ([36]), Mason ([25]), Weber ([42]), Fowler ([13]), and Bosworth ([3]), respectively. On looking over the collected cases, it is observed that while these tumours may arise from any part of the nasal fossæ, there are certain sites selected more frequently than others. The septum and upper turbinated bodies are particulary liable to attack. In the former situation the neoplasm, by perforating the cartilage, or by involving it in the tumour mass, may extend into both nostrils. When the growth developes rapidly, and is round-celled in structure, it may be mistaken for an abscess, or a soft syphilitic growth, and when hard and composed of spindle-celled tissue, it may resemble an enchondroma.

Examples of fibro- and spindle-celled sarcoma are not very frequently met with in practice, but cases have been recorded by Duplay ([8]), Mo ([26]), Chassaignac ([7]), Clamettes ([6]), Schmiegelow ([37],) Terrier ([38]), and Major ([24]).

Passing from the sarcomatous tumours, a few remarks may be made regarding the carcinomata.

Primary carcinomata of the nasal fossæ are seldom met with

* The Bibliography will be found at the end of Chapter XII.

in practice, and very few examples have been recorded. Many of the tumours designated "cancerous," probably on account of the symptoms associated with them, have, on more careful inquiry, proved to be fibromata of the naso-pharynx. In the early stage of malignant disease of the nasal fossæ, it is, in many instances, not only impossible to say whether the tumour is a carcinoma or a sarcoma, but it is difficult to pronounce the affection to be malignant or benign. At first the malig nant growth may present the same aspect externally, the same colour, consistence, pedunculated form, and give rise to the same kind of discharge as an ordinary mucous polypus. The malignant growths have, as a rule, a greater tendency to undergo degenerative changes than the benign new formations, and, not uncommonly, even before the local condition raises any suspicion as to the nature of the disease, alteration in the general health may lead one to fear the presence of something more than a simple polypus.

By far the most common variety of carcinoma met with in the nasal fossæ is the epithelioma. Stated roughly, it may be said that two thirds of these tumours are epitheliomata, while the majority of the remaining third are adeno-carcinomata.

Case XXVIII. (4).—*Adeno-carcinoma of left inferior turbinated body. Complete nasal obstruction. Little pain and slight hæmorrhage. Operation. Recurrence. Death in three months thereafter.*—J. M., aet. 47, chrome worker, was admitted into the Glasgow Infirmary, November 16, 1889, complaining of inability to breathe through the left nostril, and also of external swelling on the left side of the nose. About 20 years ago the septum of his nose became perforated; this he attributes to the action of the irritating chemical substances amongst which he works, and he says that many of his fellow-workmen are similarly affected. On examination, a large rounded perforation is seen in the nasal septum, large enough to allow a shilling to pass from one nostril to the other. The margins of the perforation are smooth, completely cicatrized, pale in colour, and free

from ulceration. The anterior margin of the perforation is situated about half-an-inch from the tip of the nose. In the month of May (1889) the patient began to notice an obstruction in his left nostril, preventing him from breathing through it, and giving the sensation of the presence of a foreign body. There was never pain in the nose or elsewhere, but several times small quantities of blood escaped from the left nostril, and although not much blood appeared at once, there was a continuous clear or blood-stained watery discharge. On examination the swelling is seen to be confined to the left side of the nose, and this growth, the patient states, commenced soon after he felt the nostril was obstructed, and since then it has gradually increased. He believes that the swelling has not become any greater during the last month. At the present time respiration through the right nostril is free, and nothing abnormal can be seen there. The patient has never complained of any pain in the nose, but nearly every night suffers from frontal headache.

The tumour occupies the anterior half of the left nostril, and almost touches the septum. It is firmly attached to the inferior turbinated body by a broad base, and has grown so as to cause considerable swelling of the face, and some displacement of the nasal bones. The tumour is of a pale pink colour, is irregularly nodulated on its mucous surface, and presents somewhat the appearance of coarse œdematous granulation tissue. When its surface is injured it bleeds freely.

A small portion was removed for microscopic examination. Several sections of the tumour were examined, and they all presented very much the same structure. The great bulk of the growth was made up of tubes and cavities lined by cylindrical epithelium. In some parts the glandular structure was well preserved, and there was a distinct basement membrane. In other parts large spaces were seen, which were found to be packed full of irregularly shaped epithelial cells, but even in these spaces the cells next the stroma preserved to a considerable degree the cylindrical form. The whole of the tumour was

traversed by a well formed, but not very abundant fibrous stroma: so small in amount was the fibrous tissue, that, in some parts, it was with difficulty detected in unstained sections.

From the microscopic characters of the tumour it was evident that we had to deal with an adeno-carcinoma, or what is called by some writers a cylinder-celled epithelioma, or malignant adenoma. I assured the patient that little could be done for his relief, for surgical interference would probably do harm rather than good, unless we could succeed in extirpating the entire tumour. I also told him that such an operation would be a formidable one. He determined to return home to consider the matter. In the month of January 1890, the patient was seen twice, and on his second visit (on the 21st) the tumour was observed to have increased in size, and he was recommended to come into the hospital immediately, but he did not make his appearance again till March 31. Then he was very anxious to have an operation performed at once, but I was very reluctant to interfere with a malignant tumour the size and extent of which it was now impossible to determine.

At the operation, the extent to which the tumour spread showed that there was little hope of excising it entirely. Even although I removed the tumour very freely (as will be shown when the operations for malignant disease are described), first with the knife and afterward with Volkmann's spoons, and the thermocautère, still recurrence took place within a few weeks, and the patient died in less than three months thereafter, that is to say, about sixteen months after the tumour was first observed by the patient himself, though probably the onset of the disease occurred at a more remote date.

Case XXIX. (5).—*Myxo-carcinoma of right middle turbinated body of ten months' duration, complete removal. No recurrence.*—The patient, J. K., æt. sixty-one, a labourer, was admitted into the Glasgow Royal Infirmary, July 11, 1890, complaining of inability to breathe through the right nostril, which he observed for the first time ten months previously,

at that time the obstruction being attributed to a "cold in the head." There was little or no pain. On admission the right nostril was found to be almost completely occluded by a tumour springing from the middle turbinated body. But while the growth was observed to be in close contact with the septum, that structure was found not to be involved, as a probe could be easily passed between it and the inner surface of the tumour. The neoplasm was very irregular and nodulated, was highly vascular, and, on the slightest injury, bled freely. A small portion of the tumour was removed for diagnostic purposes, by spoon-shaped forceps, which when cutting through the growth, showed it to be of a hard brittle consistence, somewhat resembling frosted turnip.

On microscopic examination the tumour was found to be a myxo-carcinoma, and the sections presented the following structure. The great bulk of the tumour displayed the ordinary characteristics of a myxoma, but through small areas the changes about to be described were observed. The surface of the tumour was seen to be covered by stratified squamous epithelium, which, for the most part, was practically normal in appearance, but at several points on the surface of the section the epithelium was noticed to dip down into the deeper tissues, and was no longer limited by a basement membrane, but extended into and was intimately mixed with the other cells of the tumour. In some parts of the sections distinct nests, or laminated capsules, were discovered, while, in other portions, the epithelium lining the mucous ducts was found to have proliferated freely.

The tumour being undoubtedly malignant, and still small in size, I advised the patient to have the growth removed as soon as possible, and, as I had to leave Glasgow for a few days, I asked my assistant, Dr D. M'Kellar Dewar, to operate by the same method as I had employed in removing the tumour from J. M. (case 4).

After extirpation, the growth was found to weigh one ounce The patient made a good recovery, and, when seen last in June

1892, (twenty-three months after the operation), there was no recurrence, and the wound had healed so well that the cicatrix was only seen on very close inspection.

In the earlier surgical writings of this century very little reference was made to primary malignant disease of the nasal fossæ, and no clear distinction was drawn between the two great divisions of malignant neoplasms, the carcinomata and the sarcomata. Writers, at that time, clearly distinguished, however, a form of disease in which they considered it inadvisable to operate, on account of the danger of doing harm rather than good to the patient. The earliest recorded cases, if we exclude the vague and unsatisfactory records of antiquity, are one published by Jonne Babtista Palletta in his "Exercitationes Pathologicæ," Mediolani, 1820, and another by M. Gerdy in the "Traité des Polypes," published by him in Paris in 1833. In the absence of microscopic examination of the tumours, it is very difficult to ascertain their precise nature, as the descriptions given are equally applicable to different forms of malignant disease. In examining the literature of the subject, the bibliography of which is appended, these and other cases of a doubtful nature will be omitted. The term "cancer" has been so frequently used as equivalent to "malignant," that only by careful inquiry into each case is it possible to form a reliable opinion, many of the published cases of malignant disease not being histologically carcinomatous although called so. Within very recent times, however, a sufficient number of cases of primary malignant disease of the nasal fossæ has been recorded to afford us ample material for making an accurate classification, and drawing general conclusions respecting the symptomatology, diagnosis, prognosis, and treatment of the diseases at present under consideration. The most common variety of malignant disease is the round- or the spindle-celled sarcomata, but while these are the most common, sarcomata may occur in great variety, and present considerable diversity in their life history and naked eye appearance. Some namely, the small

round-celled sarcoma, are of very rapid growth, and are composed of soft, highly vascular tissue, which, on microscopic examination, is found to be composed almost entirely of round-celled embryonic connective tissue. Between this type of growth and the hard, firm fibro-sarcoma there are many gradations, just as is found in tumours occurring in other parts of the body. Therefore, it is not always easy to draw a clear line of distinction between them; indeed, in many instances, different portions of the same growth present a remarkable diversity in their histological structure, the older portions, as a rule, being more fibrous or more highly developed than the newer parts; and, when recurrence occurs, after extirpation of the primary tumour, the secondary formations are generally more rapid in growth and lower in type of development than the tumours first removed. From an inquiry into the literature of the subject, it has been found that the most common malignant diseases of the nasal fossæ are the round-, and the round- and spindle-celled sarcomata.

CHAPTER XII.

MALIGNANT DISEASE OF THE NASAL FOSSÆ —*Continued.*

Etiology—Influence of age in Sarcoma and Carcinoma—Benign Growths becoming Malignant—Diagnosis—Co-existence of Benign and Malignant Growths—Distinction between the Sarcomata and the Carcinomata—Relationship of the Tumour to other parts—Prognosis—Treatment—Question of operation, methods, and special dangers—Bibliography.

On the subject of *etiology* in sarcomatous disease I suppose something must be said, if only to show how little is known. Catarrhal inflammation is said to predispose to sarcoma, but upon what ground the statement is founded I have been unable to ascertain. The influence of age is shown in the following table:—

Ages of patients affected with Sarcoma.

Below 10 years, ...	6 per cent.
Between 10 and 20 years	19 „
„ 20 „ 30 „ . .	8 „
„ 30 „ 40 „ . .	9 „
„ 40 „ 50 „ . .	39 „
„ 50 „ 60 „ . .	8 „
„ 60 „ 70 „ . .	9 „
Above 70 years, ...	2 „
	100

From the table, it will be seen that the ages most liable to attack are those between 10 and 20, and those between 40 and

50 years, while persons above 50 and below 10 years of age seldom suffer from sarcomatous disease of the nasal fossæ. As regards sex, it appears that a little more than a half of the persons attacked were males.

In carcinomatous disease, the influence of age is more distinctly seen than in the sarcomata, for we find that 63 per cent. of them are over 50 years of age, and of these 44 per cent. are between the ages of 50 and 60. Cases recorded by Agnew (45), Fleury (54), Watson (76), and Pemberton (66), certainly are said to have occurred in young persons, the patients' ages respectively being 8, 20, 4, 5, years, but from the descriptions of these, I think there is considerable room for doubt, in the absence of microscopic demonstration, regarding the carcinomatous character of the disease. Indeed, these cases appear to me to be more like examples of sarcoma. A question of considerable interest is, whether or not a benign tumour, such as a mucous polypus, may spontaneously, or as a result of instrumentation, undergo changes of a malignant character. In his chapter on Nasal Polypus, Bosworth[1] states the case thus:—"This question is naturally much confused, in that it may be that those cases which have undergone malignant degeneration, have been largely the result of crude methods of extirpation, rather than of any inherent tendency of the myxomatous tumour to undergo this form of degeneration. Billroth states that the view that these growths may take on carcinomatous degeneration, has been accepted as an article of faith, rather than proven, since the only absolute proof that we could have of such a change, would be to find a case in which the same tumour, beginning as a mucous polyp, would subsequently develop into one of the malignant type, and such a case to his knowledge does not exist. In this same work, however, he cites a case which from its history seems to have been at first one of mucous polyp, which after operation apparently took on a carcinomatous degeneration. He also reports a second case which may possibly have been an

[1] Diseases of the Nose and Throat, vol. i. p. 399.

early stage of a similar change. In a subsequent work, however, he goes so far as to state that the tissue found in nasal polypi is frequently adeno-sarcomatous, but he is somewhat vague as to the clinical significance of this tissue. J. W. Hulke[1] reports a case of nasal polyp, which after operation at varying intervals of time developed into malignant disease, although the report of the case is unsatisfactory. Sajous makes the general statement, without further comment, that nasal polyps occasionally degenerate into sarcoma. A search through the literature of the subject fails to reveal on what grounds this statement has been made, and yet a somewhat vague impression of this sort seems to prevail in the minds of most observers. Thus Lennox Browne, after asserting that after operation these polyps assume more of a fibrous character, states also that they frequently shew under the microscope evidences of sarcomatous structure. Now Butlin makes the statement that it is impossible to distinguish microscopically between round-celled sarcoma and normal granulation tissue, which would seem to infuse an additional element of obscurity into the question. Beyer, who has made a somewhat laborious study of this question, reports one case under his own observation, of a man fifty years of age, operated upon by the galvano-cautery for 'nasal polypus,' who, two months later, had developed cancerous papilloma (Zottenkrebs). Schmiegelow cites a case, reported by Schäffer, of a man forty-two years of age, with nasal polypi and naso-pharyngeal fibro-sarcoma, in which the polypi, in the course of a year, took on sarcomatous degeneration. An interesting case bearing on this point came recently under my own observation. A German, aged forty-eight, who for a year had suffered from nasal polyps, which had been operated upon a number of times with forceps, followed by their rapid recurrence, came under my care November 11th, 1887. I removed a number of small polypi, and came down upon a soft, grumous-looking mass, springing from beneath the middle turbinated bone, which bled profusely on the slight-

[1] Ophthalmic Hosp. Reports, vol iv., p. 98, 1883-1885.

est manipulation. A small portion was removed, and under the microscope the growth was shown to be angio-myxo-sarcoma This patient was seen a number of times, at intervals of a fortnight, and the whole growth successfully extirpated by means of the cold wire snare. When last seen he had gone six months without a recurrence. The microscopic character of the neoplasm in this case would seem to lend weight to the view that a myxoma may take on sarcomatous degeneration. I think Schäffer's case may be excluded, as throwing no special light on the question under discussion. The other cases, however, it seems to me, afford undoubted evidence that these tumours may undergo, not only sarcomatous, but probably carcinomatous degeneration, probably, however, only as the result of operative interference; and yet when we remember the very large number of cases of mucous polypi which are subject to exceedingly crude and harsh methods of removal, I think the statement may safely be made, that this tendency toward malignant degeneration is a somewhat feeble one. As far as I know, there is no well-established case in literature of nasal polypus having undergone malignant degeneration spontaneously.

The *diagnosis* of malignant disease has been referred to already, but still there are one or two points to which the attention of the reader requires to be directed; one worthy of note is, that malignant and benign neoplasms often co-exist in the same individual. Voltolini, Hopmann, Schæffer, Terrier and Ricard have recorded instances where the two varieties of tumour have been associated. My third case is, no doubt, an example of this. It is necessary to bear in mind that it is not always right to conclude that because a benign growth has been removed from the nostrils, and proved to be such by a microscopic examination, therefore, other growths occurring in the same individual are also benign.

Mackenzie says that the most common situation for malignant growths to appear in is on the septum, and it is stated by Dr A. F. Plicque that "a polypus inserted on the septum must, in fact, always be regarded as of malignant nature." This is certainly not

so. I have removed fibromatous and myxomatous tumours, which were clearly attached to the septum, in which, during the course of the case, no suspicion was raised of malignancy, either by the clinical history, by the microscopic appearance, or by the subsequent course of events.

In many instances, as in the cases I have just now described, the tumour may increase slowly at first, but in the end, either as a consequence of injury or of operative interference, it may fill up both nasal fossæ, and extend to the cavity of the skull by invading the ethmoid and sphenoid bones. In a case recorded by Duplay a tumour existed on both sides of the septum, the cartilage being perforated by the growth. It was soft and fluctuant, of a reddish white colour, and fluctuation could be detected by placing a finger in each nostril. The tumour was mistaken for an abscess, and incised, but no pus escaped, and shortly after the neoplasm invaded the whole cavity of the nose, and the patient died. This, and a few similar cases, illustrate very well the great difficulties attending the diagnosis of soft round-celled sarcomata, not only in the nasal cavity, but in all parts of the body.

The indications of malignancy, namely, rapid growth of the tumour, pain, frequent and copious hæmorrhage, and the appearance of the parts, together with the general constitutional symptoms and aspect of the patient, are not always present. Many eminent surgeons have been led astray by these characteristics being entirely absent. This is most notably observed when benign growths occur side by side with malignant new formations. As a rule, but there are exceptions, malignant growths are sessile, whereas the majority of benign tumours of the nasal fossæ are pedunculated.

When malignant neoplasms have become diffused, that is to say, when they have passed beyond the range of operative interference, the diagnosis is generally easy, and the features of the case only too clearly indicate the probable course of events. In such cases the questions: Should a radical and

sometimes formidable operation be resorted to, or should we be satisfied by adopting palliative measures? are seldom raised, unless the patient, as in my fourth case, demands that an operation be performed, without the full concurrence of the surgeon.

To distinguish between carcinomata and sarcomata during the early stage of the disease is not always easy, without the removal of the tumour, or a portion of it. As a rule the sarcomata, except the spindle-celled variety, give rise to more profuse, and more frequent, hæmorrhages than the carcinomata. Indeed, in cases of the first-mentioned disease the slightest manipulation may occasion severe bleeding, which is frequently difficult to stop. Again, I think I may say that during the early course of the disease, pain is not complained of to the same extent in cases of cancer as in those of sarcoma.

When the disease has made much progress, there is unfortunately little difficulty in diagnosis. Symptoms, such as severe pain, repeated and profuse hæmorrhage, and suppuration, doubtless may be the result of such tumours as the osteomata, fibromata, or soft papillomata, but these growths do not increase rapidly in bulk, nor do they ulcerate or give rise to cachexia and involvement of the lymphatic glands, which are observed so frequently in malignant disease.

When the nature of the tumour has been ascertained the next question which presents itself is, What is the site of origin of the tumour, and what is its relationship to other parts? It is desirable that these inquiries be answered, if possible, before the surgeon determines what course of treatment should be adopted.

In a few instances, and only when the patient came under observation during the early stage of the disease, the point from which the growth originally sprung has been ascertained; in the great majority of cases recorded, the patient has sought the aid of the surgeon only after the tumour had increased so greatly in bulk that the most skilful anterior and posterior rhinoscopic examination failed to reveal the original site or nature of the attachment of the neoplasm.

In such cases it is only after an operation has been performed for the removal of the disease that the relationship of parts is made out. This was so in my first case; in the others the point of origin of the disease was easily ascertained.

When tumours occupy the nares, the relationship which they bear to other important structures must be kept in view. For example, in my third and fourth cases, the upper parts of the nostrils were involved, in the former the middle and superior turbinated bodies, in the latter only the middle turbinated, as far as could be made out. In both of these instances it was abundantly evident from the history that the growth penetrated the skull and gave rise to the serious cerebral complications from which the patients died.

Most of the recorded cases of cancer of the nasal fossæ have been described as simply carcinoma, without reference to any particular variety. It is therefore difficult to say which form of the disease is most frequently met with, but as far as I know epithelioma and adeno-carcinoma are comparatively common, while only a few cases of melanotic cancer, and of cylindroma have been published.

The *prognosis* is very unfavourable, but not so immediately bad as in malignant disease in other parts, as in the nose not infrequently the neoplasm grows slowly, and the glands do not rapidly become involved. The surgeon must form his opinion regarding the case according to the nature and the rapidity of growth of the tumour, the age of the patient, the duration of the disease, and the extent to which it has spread; also, the possibility of removing it completely. I shall consider these points in their order.

The round-celled sarcomata, and the encephaloid carcinomata, are the most malignant forms of disease. Of the sarcomatous formations, those which contain in their substance normal tissues such as the myxo-sarcoma, the adeno-sarcoma, and the fibro-sarcoma, are more easily removed, and are not so liable to recur, whereas pigmented sarcomata, myelo-sarcomata, glio-sarcomata,

and angio-sarcomata, are likely to cause death within a short time. The tumour known as carcinoma cylindriformes is recognised as the least malignant form of cancer.

The age of the patient is of much importance; in young persons, when they are attacked with sarcomatous disease, the tumour spreads with great rapidity, and usually death occurs within a few months of the onset of the trouble. In middle life, the patient is more likely to be able to stand a serious operation than when advanced in years; and, moreover, in cases of cancer in aged persons, the power of resistance is much diminished, and the individual is less able to withstand the exhaustion induced by the disease. When the disease involves the upper part of the nares, anything in the way of a radical operation is impossible, and even attempts at partial removal of the disease are contra-indicated, as evil rather than good is likely to result from such interference, not only by causing a more rapid extension of the tumour, but also by inducing meningitis. When any operation is contemplated upon growths in the situation indicated, it is advisable to pay special attention to cerebral symptoms. The importance of attending to this is well illustrated in my third case, where shortly after I first saw the patient, he developed such a train of symptoms pointing to cerebral involvement, viz., temporary aphasia, inability to write correctly, flashes of light in the left eye, and paresis of right arm and leg, that I not even for a moment contemplated a radical operation.

In the second case it was also evident that any attempt at complete removal of the tumour must end only in failure; the question, therefore, of serious surgical interference was set aside, and the only operation attempted was removal of very vascular portions of the growth by the electric écraseur for the purpose of temporarily restraining the hæmorrhage.

In regard to *treatment*, the cases of malignant disease of the nares may be divided into two classes:—(First), those in which some hope may be entertained of completely removing the

diseased parts, as in cases 1, 2, 4, and 5; and (Second) those in which operative interference can only do harm.

Even when the disease appears to be limited in extent, a preliminary operation for the purpose of getting free access to the nostrils is necessary. It is not advisable to trust to the simpler but less effectual methods of removal by the snare, electric-cautery, loop, or forceps. If anything is done it must aim at complete removal. Excision of small portions of a tumour for diagnostic purposes may be justifiable, but, when the disease is known to be malignant, other circumstances being favourable, the sooner a radical operation is performed the better. Elsewhere I have drawn attention to the danger of inducing rapid dissemination of cancer by partial removal of the tumour.[1]

It is not necessary for me to describe, or to discuss the respective merits of, the numerous methods which have been proposed by different surgeons, as they include all possible methods of turning aside the external parts for the purpose of gaining access to the interior of the nares. Indeed, in dealing with malignant disease in this region, the operator must be guided not so much by what he knows of the case previous to operating as by what he sees during the operation. The performance of a certain operation, as described by another surgeon, may be on the one hand unnecessarily severe, or on the other inadequate, according to the conditions of the individual case.

In cases of sarcomatous disease, the great endeavour of the surgeon should be to recognise the disease as early as possible, and free the patient of it as soon and as completely as he can.

In Cases 4 and 5 similar operations were performed. A free incision was made along the naso-labial furrow; the subseptum, and the cartilaginous septum were divided, and the soft parts reflected upwards. The posterior nares were plugged, so as

[1] Transactions of the Clinical Society of London, vol. xxii. p. 104; and chap. viii. p. 102 of this work.

to prevent the passage of blood into the larynx, and in both instances the growths were freely removed by scissors, Volkmann's spoons, chisel and cautery, with the object of carrying the section beyond the diseased and into the healthy parts. In Case 4 the hæmorrhage was very severe, and even after removal of the turbinated bones and a large part of the left superior maxilla, it was found impossible to remove all the disease. The cavity, which was of very considerable size, was carefully packed with long strips of iodoform gauze, and the ends were allowed to protrude from the anterior nares. The hæmorrhage was thus easily checked, and the external parts were brought into their normal position. In Case 5 the tumour was limited to the mucous membrane of the middle turbinated body, but notwithstanding this limitation, the growth was removed *en bloc* along with a considerable mass of surrounding healthy tissue, while the base of attachment was cauterized, and the result, as has been seen, was most satisfactory. No recurrence has taken place within twenty-three months of the operation. Usually, if the tumour is not completely removed, it reappears within a few weeks at the longest.

The first case (Case 1) required a less formidable operation, on account of the growth being small in size, and situated at the anterior part of the septum. In this instance, only the right side of the nose was reflected by making an incision in the right naso-labial furrow, and across the upper lip, a little to the left of the septum. The space given by this incision was quite sufficient for complete and easy removal of the tumour, first by scissors and Volkmann's spoon, and afterward by the free application of the cautery.

One or two observations may now be made regarding the special dangers attending operations in the nasal fossæ. One of the most serious dangers is hæmorrhage, especially when the tumour is of large size. The passage of blood from the nares into the larnyx and trachea has also led, in a few instances, to bronchial and pulmonary complications, while infective diseases

such as septicæmia, erysipelas, and acute meningitis, have been responsible for a few deaths.

In endeavouring to check hæmorrhage the surgeon is compelled either to employ tampons, or to plug the nares with antiseptic dressings. But on account of the offensive discharge, and the septic conditions previous to the operation, it is impossible to keep the exudations sweet for any length of time.

A method I employed in operating upon a large soft ulcerating fibroma answered very well. It is one which might be used for the removal of a malignant tumour. I performed tracheotomy a week previous to the removal of the tumour in the nose. After the patient was anæsthetized a large sponge was placed in the posterior nares and pharynx so that, while chloroform was administered by the tracheal tube, no blood passed into the mouth or trachea. Ollier's operation was then performed, and the tumour completely removed, after which very profuse hæmorrhage occurred, but was soon checked by douching the nares with carbolic solution at 180° F. (1-40 of water). When the operation was completed, the sponge was removed from the posterior nares, and a clean one inserted, so as to completely shut off the nares from the mouth. The tracheal tube was retained for a week, the patient was fed by means of an œsophageal tube, and the nares were douched freely three times a day, with an antiseptic solution. By these means, even although the discharge was most offensive previous to operating, the wound was kept quite sweet.

The statistics of intra-nasal operations for malignant disease are far from satisfactory, for in the large majority of instances the operators have published the cases at too early a date, and have neglected to give the ultimate result at a later stage. Of course where the operation has failed to remove the disease entirely, the course of the case can be easily surmised, but in those examples where the surgeon has assured himself that he has excised the whole tumour, surely it is his duty to let the ultimate as well as the immediate result be known.

The results of the operation for the carcinomata are most discouraging, while those for sarcomata are only a little more favourable.

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CHAPTER XIII.

MALIGNANT DISEASE OF THE TONSILS.

Malignant disease of the tonsils—general remarks and narration of cases of sarcomata and carcinomata.

THE larger works on general surgery, and even the more modern books which are devoted by their authors to the special consideration of diseases of the throat, fail to mention, or devote only a limited space to, malignant disease of the tonsils. This circumstance demonstrates one of two facts: either the disease rarely attacks the tonsils, or, until recently, observers have failed to record the cases brought under their notice. That the latter rather than the former is the case is shown by the bibliography appended, and by the fact that within my own experience I have been called upon to treat ten cases.

The scanty attention bestowed upon the subject is shown by the very brief reference given to malignant disease of the tonsils in one of the best books on diseases of the throat of its time. Sir Morell Mackenzie, in the edition of his book[1] published in 1880, says:—

"This is a rare disease, but cases have been reported by Velpeau, Maisonneuve, Lobstein, Lennox Browne, etc. Most of the reported instances belonged to the encephaloid variety, the disease being in some cases primary, and in others due to extension from adjacent parts. I have met with seven cases of cancer of the tonsils, five of which were encephaloid and two scirrhous."

[1] Diseases of the Throat and Nose, vol. i., p. 83.

The statement that malignant disease of the tonsil is rare—a statement which is very generally accepted—seemed to me not quite true when I discovered that within seven years I had met with ten cases. It is evident that the subject is one of much higher importance than has been generally admitted. So long as the belief exists that the tonsils are seldom attacked by malignant disease, there is a great risk of the serious nature of the malady being overlooked by general practitioners during its early stage, and of its being mistaken for some acute or sub-acute inflammatory affection of the gland, or a syphilitic new formation.

Ten years ago it was with great difficulty that even a few well-authenticated cases could be collected. For example, Mr Butlin, in his valuable work on *Sarcoma and Carcinoma*, published in 1882, collected nine cases of sarcomatous and three of carcinomatous disease of the tonsil. But since that time observers appear to have been more careful in recording their cases, and by the publication of such admirable compilations as Dr Semon's Journal,[1] a research into the literature of the many diseases attacking the upper air-passages has been rendered comparatively easy.

Malignant disease of the tonsil is so fraught with danger, and its consequences are so serious, that it should be the endeavour of all who have any opportunity, to investigate as far as they can the means of diagnosing the disease as early as possible, and to add what they can to the methods we possess of alleviating suffering, and if possible, of saving life.

In carcinomatous disease of the tonsil, as in extrinsic cancer of the larynx, or in epithelioma at the base of the tongue, the lymphatic glands rapidly become involved, whereas in some of the sarcomata, especially in the spindle-celled variety, the tumour may remain encapsuled for a considerable period, and the glands continue unaffected. I shall therefore consider these

[1] Internationales Centralblatt für Laryngologie, Rhinologie, und verwandte Wissenschaften, Berlin.

two forms of malignant disease separately, as far as is consistent with a proper study of the whole subject.

Sarcomatous disease is met with in the tonsils in various forms, but by far the most common variety is the round-celled sarcoma, or lympho-sarcoma, a most virulent disease, and one in which secondary formations develop rapidly. It is a malady in which, even from the onset, little hope can be entertained of saving the patient. Of the fifty-two cases which I have collected nine were stated to be round-celled sarcoma, and eighteen were named lympho-sarcoma; twenty-three of the cases were published as specimens of "sarcoma," the exact variety not being mentioned. One example published by Scheurlen was described as a fibro-sarcoma, and another by Gray as an adeno-sarcoma.

The following very interesting case illustrates in one individual the points of contrast in the life history of the spindle-celled and the round-celled sarcomata.

CASE XXX (1).—*Encapsuled spindle-celled sarcoma of left tonsil; slow growth; lymphatic glands not involved; operation through the mouth; no local recurrence five years after operation; second sarcoma formed in right tonsil; rapid involvement of lymphatic glands, palate and pharynx; death from hæmorrhage and exhaustion five years and three months after onset of disease in left tonsil.*—Mrs B., a lady aged fifty seven years, who always enjoyed good health, and looked much younger than her years, consulted me in November 1884, regarding a swelling in her left tonsil, which her medical attendant looked upon as a subacute tonsillitis. He had been employing the usual remedies, but without any good effect; the tonsil continued to increase in size and in hardness, and caused the patient some alarm, but no pain, or even discomfort except by reason of its bulk. I found the left tonsil enlarged, hard, smooth, and freely movable. There was no involvement of the lymphatic glands. She said that she observed the swelling for the first time at the beginning of July 1884, but paid very little atten-

tion to it on account of the freedom from pain. The tonsil increased in size very slowly at first, but during the first fortnight of November its growth had been more rapid. The appearance of the tonsil and the history of the case led me at first to suppose that I had to deal with a chronic interstitial tonsillitis, but by the beginning of December I was convinced that the disease was of a malignant nature, and accordingly determined to operate at once, as the tumour appeared to me to be a favourable one for removal, the lymphatic glands being still free from disease. Having previously performed tracheotomy, I made, on the 5th of January 1885, an incision through the anterior pillar of the fauces with a knife, and soon came upon a dense fibrous capsule. I then tried to enucleate the tumour with the finger and blunt instruments, but the capsule ruptured, and the growth became completely broken up. I then cleared out the whole tumour mass with a Volkmann's spoon and subsequently separated the capsule from its surroundings. The opening thus left was dusted with iodoform, and the following day, when bleeding had ceased, the patient was again placed under chloroform, and the whole of the surface from which the tumour had been removed was very freely cauterized with a Paquelin's cautery. The wound healed quickly, and the patient made such a good recovery that she was able to leave for the south of France in the second week of February.

Microscopic sections of fragments of the tumour showed it to be a round- and spindle-celled sarcoma. Portions taken from the centre of the growth were composed of moderately large, round nucleated cells, closely aggregated, bound together by an almost homogeneous material, and a very delicate reticulum of what appeared like connective-tissue fibres, but probably were really the walls of blood channels. The peripheral parts of the tumour were formed almost entirely of spindle-cells closely packed together, and presented the typical structure of sarcomatous tissue.

Until the beginning of April 1889 (four years and nine months after the formation of the sarcoma in the left tonsil, and

four years and three months after its removal by operation), the patient enjoyed perfect health, but about the middle of that month, while residing in Egypt, she felt some discomfort in swallowing, and had a strong disinclination to take food. This she thought little of, as she had been travelling and the weather had been unusually cold, but when, at the end of a fortnight, she found that her throat was getting rapidly worse arrangements were made to return home. (Mrs B. knew the nature of the tumour removed from her left tonsil.) In passing through Paris she consulted, if I remember correctly, M. Ch. Fauvel, who was inclined to take a very serious view of her case, although he did not express a definite opinion regarding the exact nature of her illness.

I saw her on the 14th of May, and noticed a great change for the worse since I had met her in September of the previous year. Now her voice and articulation were indistinct, the sense of taste was impaired, there was a continuous and copious discharge of saliva, which she found a difficulty in swallowing while awake, and during sleep it escaped from her mouth in large quantities, soiling the pillows and bed clothes. Deglutition was not only difficult but painful, and occasionally fluid food escaped into the nostrils. There was no obstruction to nasal respiration, but the sense of smell was imperfect, and yet the patient complained greatly of the odour of her breath. On looking at the neck, a general diffuse swelling was noticed on the right side, and by palpation the growth could not be easily limited. This swelling she said had appeared within the last ten days, and was very rapidly becoming worse. An examination of the throat revealed the presence of a large swelling in the region of the right tonsil, and, on palpating with the finger in the mouth, the tumour in the tonsil was found to be continuous with the swelling in the neck. The whole mass was soft and almost fluctuant, and its limits could not be clearly made out; the mucous membrane of the soft palate and of the right anterior pillar was deeply injected and much swollen, but there was no

ulceration. Microscopic examination showed the tumour to be a round-celled sarcoma.

June 17, 1889. Since last note was made I have seen the patient every third or fourth day, and during that time the progress of the disease has been very rapid. Now ulceration of the tumour has occurred in the mouth, and, as a consequence, the breath is very fetid, the swallowing of solids has become almost impossible, and she has had to subsist almost entirely on fluid and semi-fluid food. The sense of taste is now entirely gone; also, she has been complaining very much of pain in the right ear, and occasionally small quantities of blood have escaped with the discharges from the mouth, which are now very copious and fetid.

It is not necessary to follow in detail the history of this very distressing case, further than to say that the sarcoma in the right tonsil grew rapidly during the summer months of 1889, and gave rise to copious and often-repeated hæmorrhages, which greatly reduced the patient's strength. She died of exhaustion following a hæmorrhage, on the 8th of October, 1889—that is to say, six months after the onset of the disease in the right tonsil. The left tonsil was unaffected by the second attack. Therefore, as far as the excision of it was concerned, the operation effected a complete cure.

Another case of sarcomatous disease, which came under my notice in 1886, illustrates in a typical form the history and appearance of the tonsil in lympho-sarcoma.

CASE XXXI. (2)—*Lympho-sarcoma of the right tonsil, following acute inflammation with suppuration; rapid extension of disease to palate, pharynx, tongue, and lymphatic glands; no operation; death in five months from hæmorrhage and exhaustion.*—The patient, J. M'M., aged fifty-four years, a merchant, when first examined by me, stated that he had been suffering from "a sore throat" for the last fifteen weeks. The disease commenced with an attack of what was believed by his doctor to be an acute tonsillitis, which, as he at first thought, ended in

suppuration. An abscess certainly formed in the tonsil and burst, after which the patient experienced considerable relief. About a month after the first onset of his illness he became aware of the presence of "a lump in his throat," but, on account of the previous inflammatory attack, neither the patient nor his medical attendant attached much importance to the presence of the swelling in the right tonsil until the tumour began to ulcerate. Then the doctor suspected the disease to be specific, and treated it accordingly, although there was no history of syphilis, nor were there any secondary manifestations. When I examined the patient for the first time, the following conditions were observed: The soft palate was deeply congested and œdematous; the uvula elongated and pressed to the left side by a smooth, soft, globular, livid mass, the anterior aspect of which was apparently covered by mucous membrane, while its inner and posterior surface was occupied by a fungating ulcer covered by a yellowish grey slough. The tumour was about the size of a golf ball, and was not limited to the right tonsil, but invaded the anterior pillar, part of the soft palate, and numerous lymphatic glands.

I was quite satisfied that I was dealing with a soft, rapidly growing sarcoma; but to make the diagnosis certain, I removed a portion of the tumour for microscopic examination, which proved my suspicions to be correct. No operation was performed; the tumour spread rapidly to the tongue, palate, and pharynx; and the patient died from hæmorrhage and exhaustion about five months after the first symptoms were complained of. These two are the only examples of sarcomatous disease which I have seen.

The following cases of cancer of the tonsil are interesting:—

Case XXXII. (3)—*Syphilitic gumma of the right tonsil, extending to the soft palate and wall of the pharynx, with early involvement of the lymphatic glands; slowly amenable to treatment, but followed by development of a carcinoma.*—W. S., a labourer, aged forty-

one years, was first seen by me at the Royal Infirmary about the end of January 1890, when he stated that about nine months ago he first noticed that he had a little difficulty in swallowing, and on looking at his throat he observed that there was a slight swelling on the right side of the throat, but he did not detect any enlarged glands in the neck until November 1889. When he came to the out-door department, he complained of great difficulty in swallowing, and considerable pain, especially at night. His breath had an extremely fetid odour, and on inquiring into the history of the case I found clear evidence of the man having contracted, and of having been treated for syphilis six years previous to the throat affection setting in. On examination, a large grey and red fungating mass was seen occupying the situation of the right tonsil, and extending forward and upward along the anterior pillar to the soft palate. The tumour was very soft and friable, and large parts of it were in a sloughing condition. On examining the neck, several greatly enlarged glands were found. These were hard, firmly fixed, and seemed to be continuous with the tumour in the mouth. In the mouth there was a large quantity of muco-purulent material tinged with blood, but on questioning the patient he informed me that he never had any severe hæmorrhages from the growth. He was weak, emaciated, and very anxious regarding his condition. I therefore recommended him to come into the ward, but he preferred to be treated as an out-patient until the 24th of April 1890. By this time the tumour had only slightly increased in size, but during the interval considerable portions had sloughed away, some of the pieces being as large as a walnut. Now the tumour was about the size of a goose's egg, and the greater part of it bulged into the mouth and pharynx, and during sleep it caused considerable difficulty in breathing. His voice and articulation were markedly nasal, and there was considerable obstruction in the right nostril. Swallowing was difficult and painful, so that his food required to be almost entirely fluid. The sense of taste

was impaired, and generally at night he suffered from severe pain in the right ear.

When the patient was admitted into the ward I examined him repeatedly, and he was also seen by my assistant, Dr D. M'Kellar Dewar. From the appearance of the growth, taken together with the history of the patient, we had considerable doubt as to the nature of the disease. The circumstances (1) that there was clear evidence of the man having contracted syphilis a few years before; (2) that the progress of the disease was slow; (3) that hæmorrhage was absent, and (4) that there was a tendency in portions of the growth to separate by sloughing, disposed me to regard the new formation as syphilitic; whereas, on the other hand (1) the marked dysphagia and severe pain radiating from the throat to the ear; (2) the marked involvement of the lymphatic glands; (3) the emaciation and anæmia, which were altogether out of proportion to the diminution in the quantity of food taken, led me to suspect the disease to be malignant. At first the patient was treated by giving him green iodide of mercury and extract of opium in pills, while the mouth was sprayed with a solution of perchloride of mercury after the use of an alkaline gargle. This course of treatment was followed by the administration of iodide of potassium in the usual way; but when the patient left the ward at his own request on the 30th of May, it was noted: "Since admission the growth has remained practically of the same size, even although large portions have separated spontaneously or in sloughs. Under treatment by iodide of potassium the tumour ceased to progress, but it cannot be said that there was any actual diminution in its bulk." Portions of the growth which came away spontaneously or were removed by forceps presented the microscopic characters of a gumma. Therefore, when the patient was dismissed, he was directed to continue the anti-syphilitic treatment, and to come to the out-door department regularly, which he did. During the summer of 1890, the condition of the throat improved very much, and for some time I

had a hope that a cure might be effected. The slow response to treatment, however, rendered the diagnosis doubtful.

During the autumn of 1890, the patient was seen occasionally at the out-door department, and until November of that year he improved considerably; but even at the best there was a marked swelling on the right side of the neck, and very distinct enlargement of the right tonsil with ulceration of its surface. From the beginning of November till the 13th of February 1891, the patient was not seen, and when he returned his condition appeared to be so much worse that I advised him to come into the ward again. The ulcerated area was now greatly increased in size, but the tendency of portions of the tumour to separate by sloughing was not so marked as formerly. The patient now complained of great difficulty in swallowing, and he suffered very much from pain at all times. The growth seemed to be harder than in November 1890, and the lymphatic glands were involved to a greater extent. In order to relieve the dysphagia a large portion of the tumour was removed, and subsequently submitted to microscopic inspection, when it was found at some parts, but not all, to present the characters of an acute carcinoma. The patient was kept in the ward for a month; during that time no improvement took place. On account of the malignant character of the disease, and the extent to which it had spread, no radical operation could be advised; the patient was therefore dismissed, palliative treatment being prescribed.

Case XXXIII (4).—*Primary epithelioma of the right tonsil; rapid and extensive involvement of lymphatic glands; no operation.* —H. W., an engineer, aged forty years, came to the out-door department of the Royal Infirmary for the first time at the beginning of October 1890. The patient was unable to say when he began to be troubled with his throat, but he was certain that in the previous July it was quite well. What he complained of most was pain in the right ear, and at the angle of the lower jaw on the same side; he also experienced con-

siderable difficulty in opening his mouth, and thought "that his jaw was becoming fixed," which he considered to be due to a hard swelling under the jaw. This swelling, he said, had been growing very rapidly of late, while at the same time the pain had become more intense, and was always worst at night. When examined by me for the first time, on palpating the right side of the neck, I found a large, diffuse, irregular, and firmly fixed tumour immediately below the angle of the lower jaw, and on passing the finger into the mouth, the tumour in the neck was found to be continuous with a growth in the right tonsil. The whole mass was as large as half a cricket ball. On further questioning the patient, the fact was clearly made out that the enlargement of the tonsil occurred fully two months before he noticed any swelling in the neck. Indeed, the involvement of the lymphatic glands was apparent to the patient for the first time at the beginning of September. On examining the mouth, a large and not very well defined tumour was found to occupy the place of the right tonsil. The great bulk of the tumour was covered by congested, but otherwise uninjured, mucous membrane; and at its anterior part, corresponding to the situation of the anterior pillar, there was a deep, irregular excavated ulcer, covered by a greyish slough. There was no history of syphilis. From the history of the case, and the appearance of the tumour, I was satisfied that it was an epithelioma. The patient was therefore advised to come into the ward, in order that a more complete examination might be made, and, if considered advisable, an operation performed. On admission to the ward, a small part of the tumour was removed for microscopical examination, when it proved to be an epithelioma; but considering the wide area involved in the tumour, its very rapid growth, and the weak and anæmic condition of the patient, I did not consider it my duty to do more than state fully the whole circumstances of the case to the man himself, and he, I think wisely, determined not to have an operation performed. In this case, I felt that the immediate dangers of

the operation were very considerable, while the prospects of prolonging life or alleviating suffering were not great.

CASE XXXIV. (5)—*Epithelioma of the left tonsil; rapid growth and speedy involvement of lymphatic glands; dysphagia, severe pain, anæmia, and death from exhaustion three months after onset of disease.*—Mrs B——, housewife, aged forty-seven years, was admitted to the Glasgow Royal Infirmary on the 23rd of December 1889, in an extremely weak and emaciated condition. So reduced was her strength that I found some difficulty in getting a history of her illness. From what she told us it appeared that only three months previously had she noticed anything wrong with her throat, and for a fortnight this only amounted to a difficulty in swallowing; but soon afterwards pain, at first slight, but subsequently severe, troubled her, especially at night. The pain extended from the larynx to the left ear, was always present more or less, but as a rule was not so bad in the morning. Beyond the pain, dysphagia, and general weakness, she complained of nothing. On examining the throat a large epithelioma was found, involving the left tonsil, and extending downward to the epiglottis, and leading to secondary formations in the cervical lymphatic glands. Those at the angle of the jaw were incorporated in the tumour, and altogether formed a mass the size of a large apple. Viewed within the mouth, the tumour was seen as a large fungating and sloughing growth, the surface of which was covered by a muco-purulent and extremely fetid discharge. On palpation it was found to be hard and nodulated; and on microscopic section it presented the character of an epithelioma. At the level of the cricoid cartilage there was a small gland, which was hard, but not fixed to the skin, nor to the underlying structures. Cachexia was well marked, the pulse very weak and small. The patient died from exhaustion six days after admission.

CASE XXXV. (6)—*Epithelioma of right tonsil, spreading to soft palate within six weeks, and to glands within eight weeks; case favourable within first three months, but operation refused by patient;*

death from hæmorrhage and exhaustion six months after onset of disease.—D. M'W., aged sixty-one years, a shoemaker, a man of intemperate habits, but who enjoyed unvarying good health until three months previous to admission to the Glasgow Royal Infirmary, on the 27th of June 1888. About the beginning of April of that year he first experienced some discomfort in swallowing, and when he looked at his throat in a mirror he noticed a swelling of the right tonsil, but, considering it to be of no importance, he did not seek medical advice until the 15th of June 1888, when he consulted me. He then gave the following history of his illness:—At the end of the first week of April he thought that a bone had stuck in his right tonsil, and, searching with his finger-nail, he caused some bleeding, but did not find a bone. At this time, the tonsil was not much enlarged, but during April and May considerable increase in its bulk occurred, so that by the end of the latter month it was "the size of a large walnut," according to the patient's statement, and the tumour had begun to grow over the soft palate. On the 17th of May there was a moderately profuse hæmorrhage (twelve ounces) from the tumour, and from that date until the 15th of June bleeding occurred almost daily, but was seldom more than two or three ounces at a time. Pain also set in about the beginning of May, and increased in severity and duration along with the enlargement of the tumour. On the 5th of June the patient noticed for the first time a distinct and separate swelling at the angle of the lower jaw, and he said that as this swelling increased, the pain in the throat and ear diminished. When examined by me at his own home I found him pale, but not emaciated. A man of 5 feet 9 inches, he weighed 10 stones, 11 pounds, but when in perfect health his weight was 11 stones, 12 pounds. Considering his condition, his general health appeared good. The voice was nasal in quality, but there was little or no impediment to breathing by the mouth, although the mobility of the tongue was impaired by the enlarged tonsil. On examining the throat, an ulcer

about the size of a penny, round in form, and with everted edges, was found to occupy the upper portion of the right tonsil, and the neighbouring part of the soft palate. The ulcer was about equally distributed on each of these parts. The surface of the ulcer and its edges presented a fungating appearance, while the surrounding mucous membrane was hyperæmic and œdematous, and covered from time to time by a very fetid muco-purulent discharge. At no time were sloughs seen to separate, nor did the patient admit having had syphilis, but, considering the life he led, his statements on this point could not be thoroughly depended upon. While removing a portion of the tumour for microscopic examination, I at the same time placed the patient on an anti-syphilitic treatment, but without any benefit being derived from it. The portion of growth removed on the first occasion showed nothing more than an aggregation of recently formed inflammatory connective tissue. After the patient had been admitted to the Royal Infirmary, namely, on the 29th of June, another specimen was taken away with cutting forceps, and on examination it presented the structure of an epithelioma.

Considering all the circumstances of the case, the general good health of the patient, the absence of emaciation and cachexia, the comparatively small size of the tumour, and the slight involvement of the lymphatic glands, I felt it right to recommend the patient to have an operation performed. This he at once consented to, but his relatives, on learning what was to be done, persuaded him to leave the hospital, and I have seen no more of him. I was informed, however, that he died about the end of September from hæmorrhage and exhaustion.

Case XXXVI. (7)—*Epithelioma of tonsil and soft palate in a patient who suffered years previously from syphilitic ulceration of throat; moderately rapid advancement of tumour, and early involvement of lymphatic glands; no operation.*—C. D., aged sixty years, dock labourer, was admitted into the Glasgow Royal Infirmary on the 26th of September 1889, complaining of difficulty in swallowing, and obstruction in the left nostril. He said that both

his throat and nose troubled him very much, but that the "first thing that put him about" was the feeling as if "something had stuck in his throat." He said that he felt as if "a boy's marble was fixed at the back of his tongue," on the left side. There was also a feeling of "stiffness" on the left side of the throat, but soon afterward he experienced pain in the left ear and down the neck as far as the sternum. At this time (May 1889) there was no difficulty in swallowing, but he suffered very much from a continual discharge of saliva and mucus from the mouth. He began to experience pain of a severe character only two months previous to admission. It was not limited to the throat, but extended to the left ear and to the left side of the thorax; he, however, believed the pain in the latter situation to be due to an injury he received some months previously. On admission the patient was feeble, and there was very marked anæmia. Examination of the throat showed the soft palate to be marked by an old and deep cicatrix, and on the posterior wall of the pharynx there were marked contractions due to healed syphilitic ulcerations. In the left tonsil, and on the neighbouring part of the soft palate, there was a deep ulcer with a small sinus, which passed into but not through the soft palate. There was great enlargement of the tonsil, and marked thickening of the soft palate; the mucous membrane was hyperæmic and the whole of the throat was covered by a white, very fetid, muco-purulent discharge. There was marked enlargement of the lymphatic glands in the neck. The history of the case and the presence of old syphilitic cicatrices led me to suspect the disease of the tonsil to be also syphilitic, but the appearance of the tumour resembled epithelioma so strongly that I removed portions of it for microscopic examination, when it was shown to be an epithelioma. Previous to admission the patient was treated for syphilis without any improvement taking place. The case was not a suitable one for operation.

CASE XXXVII. (8)—*Epithelioma of left tonsil and left posterior pillar and of uvula; no involvement of lymphatic glands; early diag-*

nosis; complete removal by operation; no recurrence twenty-four months after operation.—Mr A., aged sixty-five years, a farmer from Wigtonshire, consulted me in June 1890, when he told me that for the last four weeks he had been suffering from a swelling in his throat, and pain in the left ear. I had seen him two years before on account of a simple but somewhat chronic attack of tonsillitis, from which he had completely recovered. On examining the tumour in the throat, I found it to involve the upper part of the left tonsil, where it originated, as well as the posterior pillar and the left side of the uvula. From the appearance of the growth I at once concluded that it was an epithelioma, but to make the diagnosis certain I immediately removed a portion for microscopic examination, and the day following I completely excised the tumour, and with it a good part of the surrounding healthy tissue. I shall refer to the method of operating further on. The patient made a good recovery, and no recurrence has taken place till now (June 1892).

CASE XXXVIII. (9)—*Epithelioma of right tonsil of small size; operation advised but refused by patient; slow extension of tumour to gum and glands; severe hæmorrhages; death eighteen months after onset of disease.*—Mr S., aged seventy years, was recommended to consult me by Dr R. S. Stevenson, of Innellan, who kindly furnished me with the following report of the case: "The patient consulted me March 1889, when he complained of sore throat and difficulty in swallowing. On examination a small, round ulcer, an eighth of an inch in diameter, was plainly seen on the right tonsil. The edges were prominent and the surface covered with an adherent slough, the tonsil itself being slightly enlarged and congested. At this time the glands of the neck were not enlarged. His previous health was good, and there was no history or evidence of syphilis. In June of the same year the question of operating was discussed, and Dr David Newman's opinion was asked, but even although he strongly advised the removal of the tumour, the patient would not consent. The pain gradually increased, and by the end of summer

was constant and very severe in the occipital and temporal regions. Locally the disease gradually spread, involving the whole tonsil, and by January 1890, the lower jaw was implicated. In March there was a very severe bleeding, which lasted for six hours, and only ceased with the continued application of ice. After the hæmorrhage the pain in the head and in the mouth disappeared for fully a month, and when it did return was less severe than formerly. Swallowing also was easier. At the time of death (September 1890) both the upper and lower jaws were involved as well as the cheek, but there appeared to be no tendency to spreading in a downward direction." When I saw Mr S. for the first time, I removed a small portion of the tumour for microscopic examination, which proved it to be a typical epithelioma. With the exception of the man's age, all the circumstances were in favour of an operation, and I therefore advised removal of the tumour, but the patient and his relatives would not hear of it. This was probably the most suitable case for operation that I have seen.

CASE XXXIX. (10)—*Epithelioma of the tonsil and soft palate; excision of the tumour with the electric cautery; good recovery; well five months after the operation.*—Mrs L., aged fifty-one years, was admitted into the Glasgow Royal Infirmary on the 20th of December 1891, suffering from an epithelioma of the left tonsil and soft palate. The history of the case showed that fifteen weeks previous to admission the patient for the first time noticed that she had a difficulty in swallowing, which soon became very painful, especially on taking hot food. She tried to treat herself for some time, but ultimately had to consult her doctor, who, on account of the acute inflammation and the formation of a kind of membrane, suspected the disease to be diphtheria, but did not pronounce an opinion as to its nature. On admission the patient appeared fairly healthy, but stated that during the last three months she had been losing flesh and weight. She complained of little or no pain in the throat unless when swallowing, but great pain at times in the left ear.

This pain never affected her until after the throat symptoms had developed themselves.

An examination of the throat showed the left tonsil to be swollen and ulcerated. The ulcer extended from the tonsil to the anterior pillar, and to the margin of the soft palate and uvula. There was not much enlargement of the tonsil nor were the lymphatic glands involved, but a section of the growth showed it to be an epithelioma.

December 26, 1891. My assistant, Dr D. M'K. Dewar, performed tracheotomy to-day, after injecting cocaine subcutaneously, preliminary to my removing the tonsil.

December 30*th*. A free incision was made with the electric cautery, and the tumour, together with a considerable portion of the surrounding healthy tissue, was removed. The wound healed in about three weeks, and the patient was perfectly well five months after.

CHAPTER XIV.

MALIGNANT DISEASE OF THE TONSILS—*Continued.*

The Pathology—Very rapid extension of disease to the lymphatics in acute Carcinoma, and in Round-Celled Sarcoma—Varieties of Malignant Disease and History of Treatment.

I NOW desire to make a very few remarks regarding the *pathology, etiology,* and *diagnosis* of malignant disease; after which, treatment, operative as well as palliative, will be discussed.

In many of the recorded cases of cancer of the tonsil, the surgeons have failed to state the variety of the disease they had to deal with. It is therefore difficult to state exactly the relative frequency with which epithelioma, encephaloid, and scirrhous cancer occur, but even although the distinctions alluded to have not been made, the descriptions of their clinical history of the cases and of the anatomical character of the tumours have been in many instances sufficiently well marked to warrant me in forming a conclusion respecting the true nature of the lesion. In a few instances it has been found impossible to form an exact diagnosis.

The greatest confusion has existed in the diagnosis of malignant disease as it attacks the tonsil; just as in other parts of the body, the distinction between encephaloid cancers and round-celled sarcomata has not been made. In consequence, encephaloid cancer has been regarded as common. In both encephaloid cancer and in round-celled sarcoma the disease extends rapidly, the neighbouring lymphatic glands become involved early in the progress of the disease, and such adja-

cent structures as the pillars of the fauces, the palate, the pharynx, the root of the tongue, or the gums, are speedily encroached upon. As a result the tumour projects into the mouth, deglutition and speech become painful and difficult, and respiration is impeded even to impending suffocation. The mouth comes to be occupied by decomposing and sloughing masses of the tumour, the breath is fetid, and acrid irritating and offensive discharges trickle from the mouth; hæmorrhages are frequent and occasionally copious, and death speedily results from bleeding, exhaustion, suffocation, or septic poisoning, or a combination of these causes. In acute carcinoma, early in the course of the disease, sloughs separate and deep, foul cavities form, whereas in sarcoma, unless perhaps in the most acute variety, the tumour maintains for a shorter or longer time a consistent form, its surface for the time being is smooth and unbroken, but when the capsule is ruptured and ulceration does occur, the tumour-formation spreads with marvellous rapidity, and penetrates and infiltrates by contiguity the neighbouring parts. It does not spread so much by the lymphatic channels as by immediate contact.

With regard to malignant disease of the tonsil, Mr Butlin[1] remarks: "No matter what the variety of the disease, it runs a peculiarly rapid course to death, affecting the lymphatic glands at a very early period, and producing large and widespread tumours in the neck. This circumstance, so fatal to all attempts to cure by operation, may be explained by the very intimate relation which exists between the tonsil and the cervical lymphatic glands. Even the ordinary chronic enlargement of the tonsil is almost invariably associated with enlargement of the cervical glands; it is, therefore, not to be wondered at that carcinomas, which affect the glands at an early period in other parts of the body, have a still greater tendency to do so when they originate in parts which are so closely connected with the glands as are the tonsils. And when the peculiar character of the primary sarcomas

[1] The Operative Surgery of Malignant Disease, London, 1887. p. 173.

of the tonsil, their similarity to the structure of the organ, whether in health or in disease, is taken into account, it must be admitted that the absence of glandular affection in connection with primary sarcoma of the tonsil would be more remarkable than its occurrence. So early in the course of the disease are the glands affected that they may appear as large swellings in the neck within a few weeks of the period at which the first signs of the disease were noticed by the patient. On the other hand, there may be no visible or tangible glandular enlargement until six or more months have elapsed from the first occurrence of enlargement of the tonsil."

I quite admit the truth of these remarks so far as the round-celled sarcomata are concerned, but I would like to point out that some sarcomatous tumours, such, for example, as the spindle-celled sarcoma, may remain limited within their capsule, and therefore be capable of complete removal, as in my first case.

I may now exclude cases of acute carcinoma and round-celled sarcoma, and consider the other varieties of malignant disease of the tonsil, namely:—epithelioma, scirrhus, spindle-celled sarcoma, or fibro-sarcoma, and adeno-sarcoma. Only a very few words are required for each variety. To the acute forms of malignant disease which I have just described, epithelioma is next in order of frequency. If you were to form an opinion from statistics previously collected, you would be inclined to believe that this was a rare variety of cancer, whereas, as a matter of fact, out of ninety-two cases of carcinomatous disease which I have collected I find true epithelioma in twenty-four.

In the same collection of cases scirrhous cancer has presented itself seven times; indeed, it may be regarded as one of the rare affections of the tonsil. Fibro-sarcoma and adeno-sarcoma are still less frequently met with. Barker and Scheurlen have recorded cases which may be placed in the former category, and Gray has published the only example I have found of adeno-sarcoma of the tonsil.

We now come to consider the question of *treatment.* In very few forms of malignant disease has operative treatment been less successful than in those instances in which the tonsil has been primarily attacked. The reason for this is not far to seek. Any one who has carefully investigated the literature of the subject must have recognised the facts that on the one hand the disease becomes rapidly disseminated, and consequently the patient is placed beyond the curative power of the surgeon; while, on the other hand, the general practitioner who has in most instances had the first care of the case, has failed to recognise its nature. This is not to be wondered at when it is remembered that most writers have taught, and still teach, that malignant disease of the tonsil is rare, and therefore not to be looked for; so that many of the cases have been mistaken for inflammatory or syphilitic affections, and having been treated as such for a shorter or longer period, the disease has been permitted to involve the structures surrounding the tonsil, and especially the lymphatic glands. If the surgeon is to finally stop the growth of the tumour, and not simply to interrupt its progress for a time, he must have the case brought under his care at an early stage, and it must be his endeavour to remove the tonsil and surrounding structures very freely.

The cases which present themselves may be artificially divided into two classes: first, those in which operative intervention is justifiable either with the object of eradicating, or of staying the progress of, the disease; and second, those instances in which palliative remedies can alone be recommended. I will immediately discuss the various methods of operating, and then proceed to consider the other palliative means which we have at our disposal for relieving the suffering of the patient and of prolonging life. These latter include the relief of pain, dyspnœa, dysphagia, and hæmorrhage.

Two distinct methods of operating have been practised; first, removal or destruction of the tumour through the mouth, and, second, the excision of the growth and of its surroundings by an

external incision. Each of the methods has been variously modified according to the individual requirements of the case. Vogel published a case, in which he operated with apparent success upon a patient, previous to 1780, but from that time till 1836, when Velpeau extirpated the tonsil of a man aged sixty-eight years, no cases had been recorded. This patient was admitted to hospital suffering from a large ulcerating tumour which completely filled the pharynx, and also blocked the nostrils, so as to threaten death from suffocation. Velpeau deemed it advisable, in order to control hæmorrhage should it prove severe, to cut down upon the carotid artery. He then placed a ligature round it to be tied if required. This precautionary measure having been adopted, he then introduced through the mouth a sharp hook, with which he dragged the tumour forward, and to the middle line, while at the same time, by means of a short knife, he divided the soft palate, and dissected out the mass of the tumour. Subsequently, by means of an external incision, he extirpated some lymphatic glands. The patient died from prostration and septic poisoning on the eighteenth day after the operation, and at the *post-mortem* examination the primary growth was found to be completely removed, and no secondary formations were discovered.

Again, in 1846, M. Feno states that M. Roux[1] removed a soft carcinomatous tumour from the tonsil of a woman aged forty years, by the mouth; and also by an external incision behind the jaw he excised a gland which was involved in the disease. Mr Lawrence, in his lectures on Surgery,[2] describes the following case:—

"A man of about forty-five years of age, who had always enjoyed good health, his occupation through life having been agricultural, came into St Bartholomew's under my care, for an enlargement of the right tonsil, presenting the usual character of hypertrophy, and obviously requiring excision, an operation

[1] For references see Bibliography at the end of Chapter XV.

[2] Lectures on Surgery, 1863, p. 611.

which I had never performed except on much younger subjects. The only complaint was of some difficulty in swallowing, apparently dependent on the enlargement. This was rather beyond the bulk that could be passed into the opening of the so-called guillotine, usually employed in the operation. I therefore cut off as much as protruded, with the effect of remedying completely what had been complained of. The part removed was simply hypertrophied tonsil. He returned to the country, with a strict injunction to come back if any further inconvenience should be experienced. He came to the hospital again in the month of October with a swelling as large as an egg, proceeding from the former site, and seeming to fill the pharynx, so as to produce a formidable impediment to the act of swallowing. This I removed with the écraseur, getting the loop of the chain over the lower end of the swelling, which was at some distance below the tongue, drawing up the ends so as to include the root of the mass, and then fixing them to the movable branches of the instrument, the action of which caused so much choking feeling and involuntary efforts of the surrounding parts, that it was necessary to hasten the process, which was accomplished almost without loss of blood. The part removed appeared as an entire tonsil, simply enlarged by hypertrophy, with slight surrounding covering of cellular tissue in a perfectly natural state. The section presented a substance of very light brown tint, similar to that of the natural gland, and in a lobular arrangement. Mr Savory reported that a most careful microscopical examination detected nothing but gland elements. This patient came once more to the hospital in July of the present year, with a swelling apparently glandular, larger than my fist, under the right sterno-mastoideus, of firm but not scirrhous hardness, and covering closely all the important structures at the side of the neck up to the angle of the jaw. It was not painful, and had not been so during its increase, which had been rather rapid."

Mr Lawrence regarded this case as one of malignant disease.

Between 1860 and 1870, cases were operated upon by Erichsen

([57]), Warren ([88]), Houel ([66]), and Langenbeck ([18]), the last-mentioned surgeon being, according to Hueter, the first to operate by an external incision in the year 1865.

Previous to the publication of Langenbeck's and Hueter's cases, Professor D. W. Cheever reported in an American medical journal,[1] in 1868, a case operated on by him.

[1] Boston Medical and Surgical Journal, 1869, p. 54.

CHAPTER XV.

MALIGNANT DISEASE OF THE TONSILS—*Continued.*

Methods of Operation—Removal of Tumour through the Mouth or by external incision—Details of Operations—Results—Palliative Treatment.

HAVING, in the last chapter, given a very brief historical sketch of the operations for removal of the tonsil in malignant disease, I shall now proceed to consider in detail the various methods employed.

Tracheotomy having been performed a week previously, an anæsthetic is administered through the tube, and when the patient is completely under its influence, the larynx should be plugged with sponge so as to prevent the possibility of any blood passing into the trachea. The surgeon has then to select his method of operating. In many instances no preliminary tracheotomy has been performed, but the risks of that operation are very slight and the advantages considerable.

A. Removal of the tumour through the mouth:

1. By chemical caustics or escharotics.
2. By the tonsillotome or curette.
3. By ligature.
4. By écraseur.
5. By electric cautery and écraseur or thermo-cautery.
6. By electrolysis.
7. By incision:
   - *a.* Without tracheotomy.
   - *b.* With tracheotomy.

B. By external incision:

a. Without tracheotomy.

b. With tracheotomy.

A. 1. Removal by chemical caustics and escharotics has been practised in a considerable number of cases which have been published as examples ultimately of malignant disease; but fortunately for the credit of the profession, this treatment has not been applied at a stage when the nature of the disease could be easily recognised. Whenever employed for the treatment of malignant tumours, the effect of the chemical agents has been evil rather than good. The only surgeon who seriously recommended the use of caustic for the treatment of malignant disease of the tonsils was Maisonneuve ([73]), who suggested *cauterisation en flèches* as a means of removing a cancer of the tonsil. This was, however, in the year 1859, at a time when powerful caustics were employed for the destruction of cancers; but notwithstanding the feeling of the time in respect to this method of treatment, the members of the *Société de Chirurgie de Paris*, before whom his paper was read, almost unanimously disapproved of this mode of treatment.

2. Excision by the guillotine, the tonsillotome, or the curette, has also been employed by some surgeons, but on inquiring carefully into the history of these cases it will be found that in those instances in which one or other of these methods of removal was employed, the serious nature of the disease from which the patient was suffering was either not appreciated at the time, or portions of the growth were removed for diagnostic purposes only.

3. and 4. The fear of hæmorrhage during an operation has induced a few surgeons to adopt the use of the ligature as a means of cutting off the blood-supply, and so causing the growth to slough away. But even those who have employed this method condemn it as useless; and but little better success has attended the use of the écraseur, as employed by Lawrence ([67]), Demarquay ([51]), Thomas ([31]), and Erichsen ([57]). In all these cases, only temporary

advantage was derived from removing only a portion of the bulky mass which protruded into the mouth and pharynx. As pointed out by Poland (76),[1] removal of malignant disease by the écraseur may be undertaken when the tumour has not attained any large size, and when the loop of the instrument can readily embrace the whole base of the tumour; but danger is attached to this operation at all times, as the loop may include some of the important vital structures in the neighbourhood—viz., the internal carotid, jugular vein, or pneumogastric nerve. To obviate this, Demarquay (51) had recourse to Blandin's (40) procedure of a temporary incision in the neck, so as to lay bare the structures he wished to avoid, and having them held aside by an assistant, then introducing the finger and conducting the loop of the écraseur over the tumour from within the mouth; he thus, so far, kept all the important vessels and nerves from the grasp of the loop. His description of the operation is as follows:—

"The case was one of ulcerating cancer of the tonsil, palate, and advancing on the base of the tongue; there was no glandular enlargement, and iodide of potassium had failed. Having carefully ascertained the extent of the disease, I thought I could remove the whole with the linear écraseur; but in order to avoid comprising within the loop of the écraseur any important structure, I made an incision four fingers' breadth along the course of the internal border of the sterno-mastoid. I reached easily the vessels and nerves in contact with the tonsils, and separated them; having done this, I proceeded slowly to remove the tumour with the chain of the écraseur; and having first made an oblique incision through the velum palati to the right of the uvula, and then carefully using Chassaignac's instrument, I seized the tonsil with hook-forceps and drew it forward to the side of the mouth, and threw the chain around the mass comprising the tonsil, pillars, and a large piece of the right portion of the velum. During the proceeding with the écraseur, I took care that it did not pass beyond the prescribed limits.

[1] British and Foreign Med.-Chir. Rev., vol. xlix., 1872, p. 490.

There was no hæmorrhage. I removed afterwards with the curved seissors a portion of the tongue in relation with the tonsil, as also some hypertrophied glands. I closed the preliminary incision, which united in a few days. The conditions inside the mouth proeeeded satisfaetorily, although he had spitting of blood for forty-eight hours, whieh ceased under the use of ice. The operation entirely succeeded; his health was restored, and he beeame stout. However, a return may take place."

By thus making a preliminary ineision, he not only seeured the carotid from injury, but was enabled to aseertain that the eaneer had not extended along the pharynx.

5. Within recent years the thermocautery and the galvanocautery have been largely employed in general surgery, and also in attempts to remove tonsils the seat of malignant disease. Tumours of this kind have been removed *per vias naturales* in several eases, as recorded by Goreeki ([12]), Wolfenden ([36]), Browne ([42]), Cozzolino ([7]), Bruee ([43]), and Donaldson ([54]).

A preliminary tracheotomy may be performed, as was done by myself (in Case 1), or, in order to get more eomplete access to the diseased parts, an external ineision may be made previous to removal by the eautery. This latter method was adopted by Barker ([2]), and Franks ([61]). Mr A. E. Barker[1] describes his operation as follows:—

"An ineision was first made along the anterior border of the sterno-mastoid musele over the gland, and it was earefully shelled out of its bed, which lay upon the great vessels of the neek. Having purposely exposed the latter, I felt less hesitation in attaeking the diseased tonsil, as bleeding could be easily eontrolled if severe. Leaving a carbolised sponge in the eervical wound for the present, I made a vertieal ineision through the anterior pillar of the fauces with Paquelin's eautery knife, and through this was able with blunt instruments to enucleate the diseased tonsil with eomparative ease, and without in the least

[1] Trans. Path. Soc. Lond., vol xxxvii. 1886, p. 219.

breaking into the mass. As this was all done by blunt dissection, only a drachm or two of blood was lost. I then removed a small nodule of growth seated at the opposite side of the base of the tongue. This was the size of a nut, and was quite distinct from the tonsillar growth; it had not been detected before. The resulting wounds were dusted with iodoform, and that in the neck was sutured. Both healed quickly without any reaction, and the patient made a rapid recovery. In May (three months after the operation) the disease was found to be advancing rapidly in the glands, and on July 14th the patient died without having any throat symptoms."

In my Case 8 the operation was performed with the galvano-cautery, as follows:—

A twenty per cent. solution of cocaine was placed in a hypodermic syringe, and along the line of the intended incision, at distances of a quarter of an inch, one drop of the solution was injected. The patient was seated on a chair, and after five minutes he was asked to open his mouth, and with the cautery at a white heat I rapidly cut out the tumour and a considerable part of the surrounding healthy tissue. The patient did not suffer any pain to complain of; there was absolutely no bleeding, and the tumour, which was an epithelioma, had not recurred twenty-four months after the operation.

6. The treatment of sarcoma of the tonsil by electrolysis has been as unsuccessful as the treatment of malignant disease by any other incomplete method. This mode of removing a diseased tonsil has been employed by Holger Mygind of Copenhagen[26], but with poor success. As a warning to others who think much of electrolysis, I will quote Mygind's words as reported:—

"The treatment with electrolysis was commenced on February 10th, and continued until March 12th, during which time the patient underwent eighteen séances, each lasting about twenty minutes. As a rule, the electricity was applied four or five days running, with intervals of three or four days. The current was produced by means of the galvanic battery recommended by

Apostoli, of Paris, for gynæcological operations; besides this, a rheostat and a rheometer were always used. The strength of the current varied from eight to twelve milliampères, beyond which strength the application caused pain. In the first seven séances the positive electrode was applied externally on the neck and the right side of the head (not including the external ear), in the form of a large fenestrated soft plate of zinc covered with moistened gauze. Later, both electrodes were applied to the growth in the form of gold needles, of which never more than two were connected with each pole. Whilst the needles connected with the positive pole always remained fixed in the growth, when first applied the negative needle had to be fixed by means of a long holder fitted to the patient's forehead, on account of its inclination to slip out. The needles were all applied so that only the peripheral part of the tumour was destroyed."

"The electrolytic treatment transformed the growth by degrees to a greyish, necrotic mass in its peripheral parts, so that it was at last possible to separate the whole original tumour by means of a slight cut with a knife through the uvula, which meanwhile had become involved in the growth. There was not the least bad smell produced by the process, nor any other sign of putrefaction, and no purulent matter whatever was observed. The temperature taken every day never rose above 99°, excepting once, when it reached 100.2°. The pulse was never beyond 60 (Mr M. was a tall man). The malignant tumour, however, pursued its rapid growth, which the destruction by electrolysis was unable to keep up with, and the increasing debility of the patient soon prevented further active treatment. The patient lost about nine pounds in weight during the electrolytic treatment, but was nearly all the time able to attend to his business (office clerk). Deglutition was not rendered more painful, and the pain in the throat and ear was considerably less during the latter part of this period, probably owing to the diminished tension in the growth, caused by its destruction.

During this time the patient took 15 grains of iodide of potassium three times daily. The last period of the disease lasted from March 13th until April 26th, when death occurrred."

7. The removal of malignant disease by incision through the mouth was, as far as I am aware, first performed by Velpeau ([86]), and was subsequently described by Warren ([88]) as a bloody and dangerous operation, requiring for the suppression of hæmorrhage the employment of the actual cautery, or ligature of the carotid. The objection to incision of the diseased tonsil with a knife or sharp instrument, is that severe hæmorrhage is likely to follow, unless in cases of sarcoma, where the growth is encapsuled, under which circumstances it may be shelled out, after a preliminary incision. The finger may be used in preference to any instrument, and by completely dissecting the growth with the finger nail more complete enucleation may be effected than by other means. When the knife is to be employed, the question suggests itself to the surgeon, Am I to remove the tumour by an incision through the mouth, by an external incision, or by a combination of these methods? If the growth is limited in size, and the glands are uninvolved, the first mentioned operation may be sufficient. The mouth of the patient should be held wide open by a suitable gag, while his head is allowed to hang well over the operating table. The surgeon then seats himself at the patient's head, so that as he views the mouth the palate is lowermost and furthest away, while the tongue is uppermost and nearest the operator. By adopting this method any blood that escapes flows from the mouth at once, or may be washed out with a douche. This method I employed first in Case 1. The mouth should be well illuminated with an electric forehead lamp, and the tumour removed by whatever means the surgeon considers most desirable for the individual case. The most common method is to seize the growth with a sharp hook or forceps, and then with a knife rounded at the point the tumour is carefully cut out, small incisions being made at each stroke, and bleeding points tied or

compressed as they appear. If neeessary, the cautery may be applied.

Again, in eases where the lymphatic glands have beeome involved they may require to be removed by an external ineision, or if the disease has extended beyond the tonsil and come to involve such structures as the pillars of the fauees, the arch or margin of the palate, or the base of the tongue, a more extensive operation than the one just deseribed may be required.

B. Operations by external ineision have now been practised in a eonsiderable number of eases. As far as I can learn, Langenbeck ([18]) was the first surgeon to use this mode of operating, in the year 1865, and the result was sueeessful; henee, sinee that time, most surgeons have shown a preferenee to removal of the tumour by pharyngotomy rather than through the mouth. The reason for this is obviously that the external ineision gives the surgeon more complete eontrol over hæmorrhage, enables him to remove the tumour more completely, and gives him more room. The method adopted by Cheever[1] is described as follows:—

"The tumour was removed by external ineision, the myo-hyoid muscle divided, the lower jaw sawn through in front of the masseter, and the tumour pressed out of the mouth. It was covered with a delieate capsule, and exuded soft material on puncture. It was removed without mueh diffieulty along with the capsule. The faeial artery and jugular vein were the only vessels tied, and there was no hæmorrhage. The wound in the pharynx was not sutured, the jaw was wired, the external wound brought together partially and washed with a two per cent. borie acid solution. On the thirtieth day the wires were removed, the jaws being firmly united. On April 27th, a second operation was performed for a tumour on the same side of the neck, and a large glandular mass was removed from the anterior carotid triangle. The throat remains healthy (May 15,

[1] *Medical Record*, May 25, 1889.

1889). The tumours proved microscopically to be round-celled sarcoma."

In order to obviate danger from blood passing into the trachea, and to facilitate the administration of the anæsthetic, it is now thought proper to perform a preliminary tracheotomy. By doing so the surgeon is free to perform a more complete operation. Czerny was the first to adopt this method. He cut down upon the lower jaw, which he divided between the second and third molar teeth. By separating the fragments the tumour was exposed and removed, and bleeding points secured or cauterized. In this operation it may be necessary to divide the gustatory, the hypoglossal, and the glosso-pharyngeal nerves, the stylo-hyoid, the digastric, and the stylo-glossus muscles, as also the lingual and some branches of the facial artery. The wound should then be washed out thoroughly with an antiseptic solution, the bone united with strong silver wire sutures or by pegs, a drainage tube inserted, and the wounds in the mucous membrane and skin sutured with two separate sets of stitches.

Another mode of operating was adopted by Mikulicz ([74]) and Kuster. The advantages claimed for it are:—that the lymphatic glands can be very freely removed, that blood escapes externally and not into the mouth, and that the wound can be dressed aseptically so long as the disease does not involve parts in the mouth beyond the tonsil. The endeavour is to remove the tonsil and affected glands without cutting through the membrane of the mouth; it is, therefore, obvious that the operation can only be used for the removal of encysted tumours, such as sarcomata. In cases where ulceration has occurred it is inapplicable. By making an incision downward and forward from the mastoid process of the temporal bone to the greater cornu of the hyoid, in a line midway between the stylo-hyoid and stylo-pharyngeus muscles, the soft parts are raised from the inferior maxilla. The jaw is then divided, and the ramus separated from the temporal muscle, so as to permit the bone to

be drawn to one side. The masseter, the internal pterygoid, the digastric, and the stylo-hyoid muscles are then divided; and care is taken that important branches of the portio dura of the seventh nerve are not injured. By this incision the tonsil is exposed, and also the lymphatic glands at the angle of the jaw, which are so frequently involved.

Before leaving the question of operation a few words are required regarding the *results of surgical interference*: first, as regards the possibility of cure; and, second, as a palliative measure.

Of the 144 cases of malignant disease of the tonsil which I have collected, in only 56 was an operation attempted. In the remaining instances, as in the majority of my own cases, the disease was too far advanced to encourage the surgeon to operate.

With respect to the incomplete methods of removing the diseased tonsil, such as the application of chemical caustics, removal by the écraseur, ligature, tonsillotome, curette, or by electrolysis, they require only to be mentioned to be condemned, as not holding out the least prospect of cure. Therefore, the only question worth consideration is the relative merit of removal through the mouth or by external incision.

As in cases of malignant diseases of the nasal fossæ, so also in those diseases as they attack the tonsil, it is, in the early stage, almost impossible to say from naked eye observation alone whether the disease is carcinomatous or sarcomatous. In some instances it is even difficult to pronounce the disease to be a tumour formation. Cases are on record where malignant disease has been mistaken for a syphilitic affection, for abscess of the tonsil, acute tonsillitis, diphtheria, simple hypertrophy, and tubercular disease.

The difficulty in diagnosis cannot be too strongly enforced on the attention of the general practitioner. From a study of the literature of the subject and from my own experience, I am

convinced that a large number of the operations have been unsuccessful on account of failure in recognising the serious nature of the disease. When there is any doubt a portion of the tonsil should be removed, examined immediately by the microscope, and if found to be malignant, the tumour should be completely excised without delay.

There are two considerations which induce the surgeon to operate. He must either have a hope of removing the disease completely, or he must have some confidence that he will be able to prolong life and alleviate suffering. When he can do any of these, then, and only then, is he justified in submitting the patient to a severe or perhaps dangerous operation.

In carcinomatous disease cure is very rare. The most successful case I know of is one communicated to me by my colleague, Dr William Macewen, of which the following is his short summary:

"W. P., aged fifty-five years, had right tonsil, large portion of pharynx, and portion of back of tongue removed through incision extending from angle of mouth to the angle of lower jaw on right side, June 27, 1878. I saw him twelve years after in good health; I have not heard from him during the last two years, and I fear that he may be dead. He was sixty-seven years of age when I saw him last."

Dr Macewen also had another case of removal of an epithelioma of the tonsil, but the patient was only kept under observation for two years, during which he was well.

Besides the cases just described I find only four cases of cancer of the tonsil in which local recurrence did not take place; they are recorded by Quintin, Fowler, Mikulicz, and myself (Case 8). The patient operated upon by the surgeon first mentioned was reported to be free from disease two and one-half years after excision of the growth.

In Fowler's ([60]) and Mikulicz's ([74]) cases local recurrence did not occur, but carcinomatous disease attacked other parts. In the former case a very complete operation was performed through

an external incision; the lingual and facial arteries were ligatured as well as the external jugular vein. After free removal of the tumour and affected glands no local recurrence happened, but the patient died from cancer of the stomach. Mikulicz's patient remained locally free for two years, when she died of cancerous disease elsewhere. In my own case the patient is still perfectly well (June 1892), twenty-four months after the operation.

Let us pass on now to review the examples of operations for the sarcomata. The most successful operations as far as I know have been recorded by Barker ([2]), Cheever ([4]), Gorecki ([12]), Gansmer ([11]), Homans ([14]), Langenbeek ([18]), Richardson ([29]), and myself (Case 1). I have communicated by letter with the above-mentioned surgeons and with others in order to ascertain the ultimate result of their operations; two of my letters have failed to reach their destination from some cause, and in three other cases I have received no reply. It appears to me that all these cases are of great interest; I shall, therefore, quote from the replies which I have received, and I shall take the cases in their order.

Mr A. E. Barker informs me in respect to one of his cases (that quoted by Mr Butlin in his book, *The Operative Surgery of Malignant Disease*, page 180), that the patient was well a year or more after the operation. In his letter he mentions a similar case in which the patient was a female aged twenty years, and where the growth had existed for six months. At the time of the operation the tumour was the size of a walnut, but the lymphatic glands were uninvolved, and there was no recurrence two years after.

Dr D. W. Cheever says:—

"So far as I know, recurrence has taken place in all my cases in from four to six months. It has recurred usually in the glands of the neck, once on the palate. I believe I have now operated four times, always with temporary relief and good recoveries from the operation."

M. Gorecki's patient was reported to be alive, and free from disease two years after the operation, and Gansmer's two and one-half years. Dr John Homans, of Boston, who operated upon a case of sarcoma by external incision on May 30, 1890 informs me that she came to see him on December 10, 1891 :—

"Looking well. Her health is good, and she has gained in weight. Her general health was never better. There is no sign of any return in the scar of the original operation or in the glands of the neck, but there have been two operations since 1890 for the removal of small affected glands. But now (December 1891) there is no sign of recurrence or development elsewhere."

Langenbeck's patient recovered from the operation, but how long he remained free from recurrence I have failed to ascertain. Dr M. H. Richardson operated successfully by external incision in 1886 ; the tumour was a round-celled sarcoma, and the patient has remained well ever since.

In a letter dated December 22, 1891, he says :—

"The last time I heard from her she was in perfect health, and was much surprised that I should have written asking if she was still alive."

In my case (Case 1) no recurrence happened in the site of the primary disease, but the patient died from a round-celled sarcoma of the opposite tonsil five years after the operation.

A few remarks may now be made regarding the *palliative treatment*, which may be employed in those cases where operative measures are unsuitable. In all cases of malignant disease of the mouth the septic and acrid condition of the secretions causes considerable irritation, and local absorption hastens the progress of the disease and causes the patient great suffering, or secretions being swallowed seriously interfere with digestive processes. It is, therefore, desirable to cleanse the mouth as thoroughly as possible by the use of antiseptic washes, sprays, or powders. The solution which I first employ in such cases is

an alkaline mouth wash, containing equal parts of carbonate of potassium, borax, and chlorate of potassium. A teaspoonful of this mixed powder should be dissolved in half a tumblerful of tepid water, to which a dessert spoonful of glycerine of carbolic acid is added, and used as a mouth wash every three hours. After using this wash for two or three days, it is a good plan to spray the mouth two or three times daily with liq. hydrarg. perchlor. full strength for a minute each time after cleansing with the wash. A spray of iodoform dissolved in ether and alcohol also acts well; oil of eucalyptus, a solution of salicylate of sodium or of sulpho-carbolate of zinc may be used in the atomizer. Again, antiseptic tablets are very easily carried about by the patient. The one which I find most useful is composed of hydrochlorate of cocaine, gr. $\frac{1}{2}$; perchloride of mercury, gr. $\frac{1}{100}$; iodoform, gr. $\frac{1}{2}$; chlorate of potassium, gr. xx; sugar, gr. x. The tablets should be allowed to dissolve in the mouth, but the saliva should not be swallowed. Not only are discomfort and pain relieved to a considerable extent by the measures just mentioned, but the progress of the disease is retarded.

As the tumour increases in bulk other difficulties and dangers present themselves; pain, difficulty in breathing and swallowing; and the danger of hæmorrhages is increased.

Pain may be relieved either by local applications or by the administration of anodynes. At first a liniment composed of equal parts of hydrate of chloral and camphor, applied over the swelling in the neck, is sufficient to relieve the patient's general suffering when the parts are at rest. But before the patient takes food it will be found necessary to spray the throat with a ten per cent. solution of cocaine. The only difficulty in the employment of this drug, is the tendency it possesses to produce copious salivation or cocaine intoxication when used continuously or too freely. When it is not found to act well, a solution of morphine, tincture of belladonna, of stramonium, or other anodyne, may be used with good effect as a gargle. As a rule, during the advanced stages of the disease, the pain is so severe

that the patient requires to be kept under the influence of morphine by hypodermic injections.

Interference with respiration is also common, either as a consequence of physical obstruction by the growth, or from spasm of the glottis, or as a result of the entrance of blood or food into the trachea. Under any of these circumstances, the patient may be relieved by tracheotomy, while at the same time, if there is much difficulty in swallowing, the patient may be fed through a soft flexible tube introduced into the œsophagus. In a case of malignant tumour Krishaber nourished a patient for 305 days through a tube introduced by the mouth, but in the majority of cases of disease of the tonsil, the danger of inducing hæmorrhage is so great that one would prefer to pass the feeding-tube through the nostril, selecting the one on the opposite side to the diseased tonsil. Partial removal of the tumour may also be resorted to, but this practice cannot be highly recommended, as rapid increase in the size of the growth follows the operation.

Hæmorrhage is a very common accompaniment of malignant disease of the tonsils, especially in the round-celled sarcomata and in the encephaloid carcinomata. When bleeding occurs, two dangers present themselves: the patient may die from exhaustion or from suffocation, by blood entering the trachea. To prevent the former I employ, in the first instance astringent gargles, or, as recommended by M. Plicque, a solution of antipyrine, 1 part in 50, may be used as an hæmostatic. Should such treatment not succeed, then ligature of the base of the tumour, either by one ligature or by several, may be resorted to, or cauterization by the thermocautery or galvanocautery may be used. In the event of none of these means of treatment succeeding, ligature of the lingual and facial arteries may be required, or as a *dernier ressort* the carotid may be tied.

When there are indications of the blood entering the trachea, but more especially if, as a consequence, suffocation is threatened, tracheotomy should be performed and a tamponed tube

introduced through the wound. To pass a tube through the mouth and plug the larynx from above is a difficult operation in such cases.

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LIST OF CASES, WITH EPITOMES,

REFERRED TO IN THE TEXT.

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